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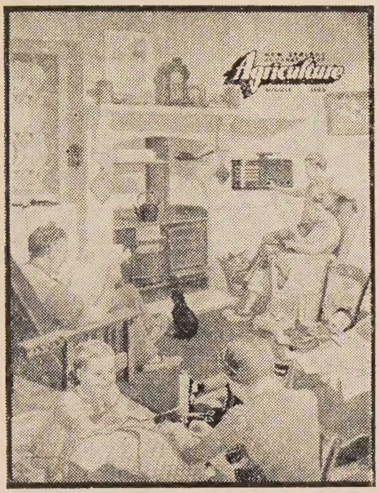
This month's cover



Because meals are usually prepared on an extensive scale, particularly during shearing and harvesting, farm kitchens are generously proportioned. Often, too, it is in the kitchen that the farm family relaxes after the evening meal; and it is such a family scene that is reproduced on this month's cover from an original painting by L. C. Mitchell. While in some respects the pattern of family life on New Zealand farms today conforms to that of previous generations, in other respects it is vastly changed. Transport facilities have been improved to such an extent that in recent years most rural areas receive newspapers and mail regularly and the farmer is able to keep abreast of stock and crop prices and general farming trends. Radio has played a most significant part in removing some of the disabilities of farming communities.

TABLE OF CONTENTS

Trends in the Production and Export of New Zealand Seeds	..	99
Care of Livestock during September	..	100
Manuka Blight Survey	T. G. Sewell	101
Farm Dairy Instruction: Quality Faults	W. G. Batt	105
The Home Garden	A. G. Kennelly	109
Radio Broadcasts	..	116, 172
Calder: A New and Distinct Variety of Swede	J. H. Claridge	117
Fine Display of Beef Cattle at Waikato Championship	..	119
Royal Commission on Sheep Industry	L. W. Woods	121
Losses in Lambs after Prolonged Wet Weather	D. H. LeSouef	122
The Management of Poultry Breeding Stock	F. C. Bobby	123
Feeding and Rearing Dairy Calves	P. J. McCann	125
Green Peas a Popular Home Garden Crop	A. G. Kennelly	129
Developments in the Use of Penicillin for Controlling Mastitis	J. F. Filmer	134
Lucerne: Points to be Observed in its Establishment	..	135
Farming in New Zealand: Southland	A. Stuart	137
Household Poultry	W. L. McIver	153
Meteorological Records for June	..	156
Seed Production in New Zealand: Subterranean Clover	J. P. Beggs	157
Beeswax Salvaged with a Hydraulic Press	E. Smellie	163
Windrowing Attachment for Harvesting Ryegrass	P. Thaine	165
Crop and Pasture Competitions	..	167
Dairy Produce Graded for Export	..	172
Left-over Meats	Edith G. McNab	173
The Flower Garden	M. J. Barnett	177
Choosing Shoes for Children and Adolescents	Eirene E. Unwin	181
The Correct Use of Paint in the Home	Edith G. McNab	183
The Nutritive Value of Animal Foods, Fruit, and Vegetables	Evelyn E. Moore	185
The Development of Speech	Dorothy Johnson	189

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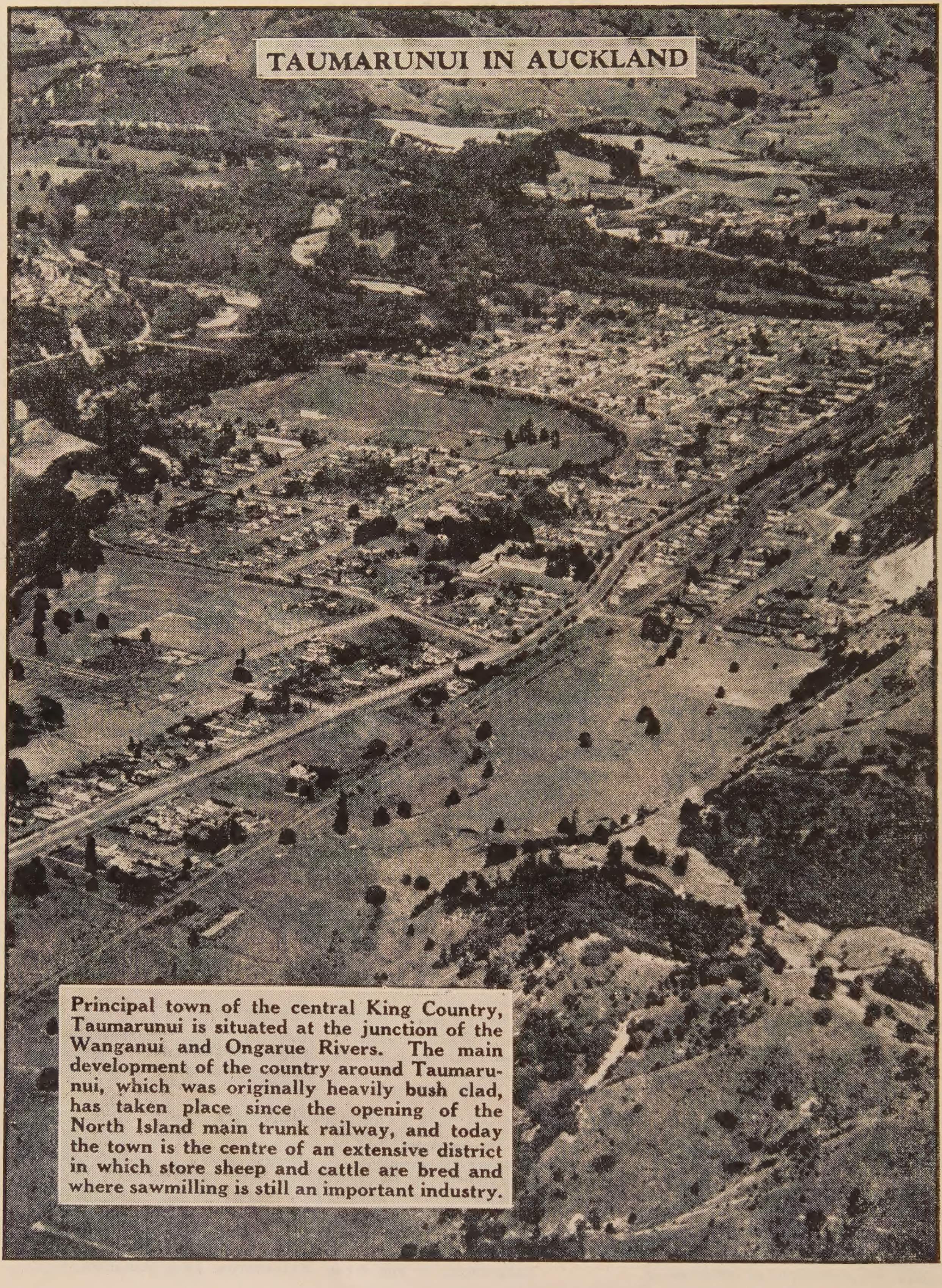
TAUMARUNUI IN AUCKLAND



Principal town of the central King Country, Taumarunui is situated at the junction of the Wanganui and Ongarue Rivers. The main development of the country around Taumarunui, which was originally heavily bush clad, has taken place since the opening of the North Island main trunk railway, and today the town is the centre of an extensive district in which store sheep and cattle are bred and where sawmilling is still an important industry.

[*V. C. Browne photo.*

Trends in the Production and Export of New Zealand Seeds

FOR many years New Zealand has been an exporter of a large variety of seeds. Toward the end of the war Britain's plans for a big resowing programme, combined with the shutting off of supplies from the continent of Europe (particularly Denmark), brought about an abnormal demand for seeds and New Zealand's exports reached very high levels. In each of the years 1938 and 1939 exports of perennial ryegrass, our most important pasture-seed export, were little more than 400 tons, but by 1944 they had reached the very considerable figure of 3335 tons; from then until 1948 exports in any one year did not fall below 2200 tons.

Accumulated stocks of pasture seeds caused Britain to reduce imports under her import-licensing system, but, though Italian ryegrass is at present completely excluded, the United Kingdom is still taking all the cocksfoot seed we can supply, limited quantities of perennial ryegrass, and some red and white clover.

New Zealand Market the Most Important

It must be firmly stated, however, that our export trade in seeds is of secondary importance; the most important market is the local market, and because the production of seeds has been rising steadily for the past 10 years this market has not suffered at the expense of the export trade. True, seed exports have been valuable earners of overseas currency, but the prime purpose of seed production, and with it the increased production and usage of Certified seeds of superior strain, is the improvement of our own pastures, thus increasing agricultural production generally.

Even during the peak export years between 75 and 80 per cent. of all New Zealand-grown perennial ryegrass seed was used in the country, and the solid expansion in the proportion of all Certified seeds is an extremely-encouraging factor today. In 1939 out of a total production of 5702 tons of perennial ryegrass seed only 33 per cent. was certified, but in 1947, when production had risen to 13,700 tons, the proportion of seeds certified had risen to nearly 70 per cent. Though production for the 1948 season fell sharply (because of seasonal conditions as well as the restrictions imposed by the United Kingdom), the proportion of the total which was certified still remained at about 70 per cent.

Another indication of the importance attached to the quality of seeds is the increased use being made of the Department's Seed-testing Station. Twenty years ago the number of samples handled annually at the station was only 10,000, but the figure is now in the vicinity of 50,000, reflecting the growing appreciation by New Zealand farmers of the value of a knowledge of purity and germination.

Contribution to Productivity

The recognition of these features—strain, purity, and germination—is also reflected in the greater productivity of our land. On the assumption that 6 sheep are the equivalent of 1 cattle beast, then the number of "cattle units" carried per 100 acres has risen from 38.8 to 50.3 since 1920, an increase of 30 per cent. Good seeds and consequently improved quality of pastures can share in the credit for this enhanced carrying capacity.

The pioneering days, when great blocks of land were still available for development, are long since vanished. The area of cultivable land in New Zealand is strictly limited and, in fact, the area under cultivation has remained almost unchanged since 1920. Increased production, therefore, can be ensured only by better farming methods, improved techniques, and the use of "good seed."

Continued Overseas Demand

Nevertheless, there is still a considerable overseas market for our seeds; Australia and the United States of America are good customers, but in spite of the restrictions, Britain is still our main overseas buyer. The total income from the sale of all seeds abroad exceeded £2¾ million in both 1946 and 1947, and some of these exports went as far afield as Belgium, the Netherlands, Canada, and even the Falkland Islands. The high quality of our seeds is evidenced by this continued demand from overseas, and there is no doubt that the system of seed certification, together with the education and knowledge spread by my Department, has been largely responsible for the progress which has been made.

I do not think it can be repeated too often that New Zealand farmers are the best and most important customers for our seed industry; too much emphasis cannot be placed on the necessity for using New Zealand Certified seeds for the improvement of New Zealand's own pastures. Along this path lies the goal of increased production and increased exports of our staple primary products.

EDWARD CULLEN,

Minister of Agriculture.

CARE OF LIVESTOCK DURING SEPTEMBER

Contributed by the Animal Research Division.

LAMB MARKING

LAMBS should never be marked in old yards, as these are bound to be infected with the germs which cause blood poisoning, lockjaw, or arthritis. Temporary yards should be erected on an area which has not been used for yards before. This is necessary even when bloodless castration is practised, as it has been proved that blood poisoning can follow this form of marking. If rubber rings are used, special care is necessary, as lambs marked with these seem to be rather susceptible to lockjaw. On fat-lamb farms the rings can be applied in the paddock on the day the lamb is born and this appears to be quite a satisfactory practice. If the ewes have been vaccinated with a view to preventing blood poisoning in the lambs, marking should be done as early as possible, as the immunity passed to the lamb in the first milk lasts only for a few weeks. Instruments should always be washed frequently in a reliable antiseptic solution.

* * *

VACCINATION AGAINST SCABBY MOUTH

When lambs are being marked is a convenient time for vaccinating them against scabby mouth. Where this disease occurs vaccination should always be practised, as it confers a very good immunity. The vaccine is available free through any office of the Department of Agriculture. If the lambs are not protected, they are very liable to suffer check, as the disease makes eating very painful.

* * *

CULLING OF DRY EWES

All dry ewes should be removed from the flock to provide extra grazing for the ewes with lambs. Dry ewes should be carefully inspected with a view to culling. Ewes which have not produced a lamb are generally best culled, as many of them are likely to prove barren in the next season. Udders of all dry ewes should be very carefully inspected and any ewe with damaged teats, large teats, very small teats, badly-placed teats, or an udder from which little or no milk can be obtained after lambing should be culled. Ewes which are to be culled will fatten more readily if they are shorn at once.

* * *

ROTATIONAL GRAZING OF CALVES

If calves are to be reared successfully, they must not be kept in a calf paddock. As soon as they are able to walk they should be rotated through the paddocks ahead of the cows. In this way they will always get good, clean pasture. This practice avoids deaths in winter, eliminates the need for drenching against worms, and produces yearlings 100lb. heavier than those reared in a calf paddock.

CARE OF PIGS

Spring-born litters should be well fed with a view to producing heavy weaners, as these are essential if high returns are to be obtained. A 40lb. weaner should be the aim of every breeder, but this weight will not be obtained unless creep feeding is practised. Meat meal will give good results if fed dry at the rate of 2oz. per pig per day at 3 weeks, gradually raising the amount to ½lb. by weaning time. Skimmed milk or whey should always be available. Wintered stores should receive only what milk is left over and if necessary some of them should be sold as forward stores. Sows should be fed adequately and mated individually, and service dates should be noted on the shed sheets.

* * *

FEEDING OF NEWLY-CALVED COWS

Autumn-saved pasture should still be available and this must be grazed in small breaks. If the pasture has been handled properly, 1 acre should provide about an hour's grazing for 100 cows, and cows should get 2 hours' grazing per day. Ample silage should also be fed, and if the ground does not pug, this can be given on the grazed portion of the autumn-saved area. After milking cows have grazed a paddock it should be cleaned up with dry stock and harrowed to spread the droppings.

* * *

MASTITIS

Mastitis is usually most prevalent in spring. Milk from all quarters should be carefully examined in a strip cup every day. If any abnormality is detected, the quarter should be treated with three tubes of penicillin cerate at 24-hour intervals. Prompt treatment at this time of the year would greatly minimise loss in production resulting from light or dry quarters.

* * *

COCCIDIOSIS IN POULTRY

To prevent coccidiosis in chickens it is necessary to keep them growing steadily. Any check is dangerous. Cleanliness is very important, as the disease spreads through the soiling of food by droppings. If an outbreak occurs, sulphamezathine should be used in the drinking water. Full particulars of dosage may be obtained from the Department of Agriculture's Poultry Instructors.

* * *

RICKETS IN POULTRY

Chickens reared without access to sunshine are liable to suffer from rickets. This can be prevented by using in the mash an oil containing vitamin D, provided an oil with a guaranteed chick-tested vitamin D content of not less than 100 international units per c.c. is used; 1½ pints of oil should be mixed with every 100lb. of mash.

MANUKA BLIGHT SURVEY

By T. G. SEWELL, Instructor in Agriculture, Department of Agriculture, Christchurch.

DURING the past year considerable interest has been taken in what is commonly termed "manuka blight," which has been associated with the death of manuka in Canterbury. Where the blight occurs dead and dying plants covered with a sooty-like growth are to be seen. Because of the numerous inquiries concerning the dispersal of blight as a means of controlling manuka on hill-country areas, the Department of Agriculture in conjunction with the Entomology Division of the Department of Scientific and Industrial Research undertook a survey of the distribution and nature of manuka blight. The author made a survey of areas of manuka in both the North and South Islands and entomologists studied the blight and checked the identification of specimens forwarded.

A BLIGHT is described as any disease affecting plants, and the fact that manuka trees are dying suggests a blight. However, the death of manuka trees is associated with a sooty mould which has been called manuka blight. The so-called blight on the manuka is in fact a fungus growth which develops on an excretion from a species of scale insect or mealy bug belonging to the genus *Eriococcus*.

The first observations on scale insects in New Zealand were published in 1887 by Maskell (1), who recorded the taxonomy and habits of scale insects and their association with sooty mould. He stated that the New Zealand climate was particularly congenial to scale insects because of the humidity and absence of anything like severe winters.

Maskell recorded 6 species of scale insects on manuka—*Mytilaspis leptospermi, Inglisia leptospermi, I. ornata, Ctenochiton flavus, Planchonia epacridis,* and *Coelostomidia wairoensis*, but not the species of *Eriococcus* which is now assocated with manuka blight in Canterbury. He pointed out that these insects have 4 stages of development: The egg, first and second larval stages, and the adult stage, in which the insect does not change its position.

The mature insect lays eggs inside its mealy scale or protective covering. When the larvae emerge they are active in locating crevices in or under the bark or on the undersides of leaves of the plant and, having found a suitable position, they begin feeding. They make a slight indentation in the bark and in addition form a protective mealy covering or scale; it is from the latter that this class of insects derives the name "scale" or "mealy bug."

When feeding, the scale excretes from a tube-like protuberance a clear, sticky solution or honey-dew, which drops on to the lower leaves or branches of the plant. As soon as the honey-dew is produced spores of a native fungus germinate in it and grow, producing the characteristic black appearance with which the insect is always associated.

Maskell mentioned a "black blight," which he stated was often referred to as a destructive pest of a number of plants, but pointed out that there were two possible ways in which the effects of the blight might be produced. First, the activities of the scale insects might drain the "life blood" of the plant; second, the honey-dew and fungus might choke the breathing pores or stomata of the plant and so tend to interfere with growth.

In discussing scale insects generally Maskell considered that birds did not favour the insects, and the usual position of the insects on the underside of the leaves or in the crevices of the bark was a great shelter and protection for them against birds.

He states:—

> . . . They are in many cases effectively covered by waxy or fibrous shields or by the masses of cotton with which they surround themselves. In the greater part of New Zealand the winters do not seem to be sufficiently severe to injure coccids [scale insects] and many of them breed as much in winter as they do in summer. It would therefore seem that everything combines to assist these insects in their career and in their propagation.

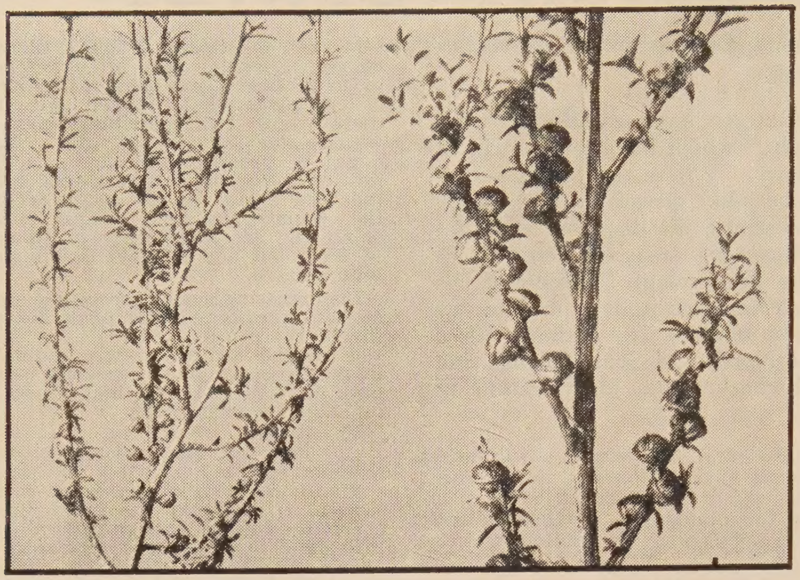
Since 1935 and in particular from 1946 onward considerable interest has been taken in the prevalence of blight on manuka. It is stated to have been spreading during the past 5 to 6 years.

The species of the genus *Eriococcus* responsible for damage to and death of manuka occurs also on kanuka, but only the former is susceptible and dies.

An article on manuka blight appearing in 1946 in a New Zealand paper (2) having a wide circulation and further articles on the subject in other periodicals during 1948 (3) promoted considerable interest. Opinion has

Manuka at Maronan, showing dead bushes killed by *Eriococcus*. The healthy-looking plants are kanuka heavily infested with *Eriococcus* but still living.

MANUKA BLIGHT SURVEY



[R. Blick photo.

This photograph shows the difference between kanuka *(L. ericoides)*, left, and manuka *(L. scoparium)*, right. It is manuka that is being killed by *Eriococcus*.

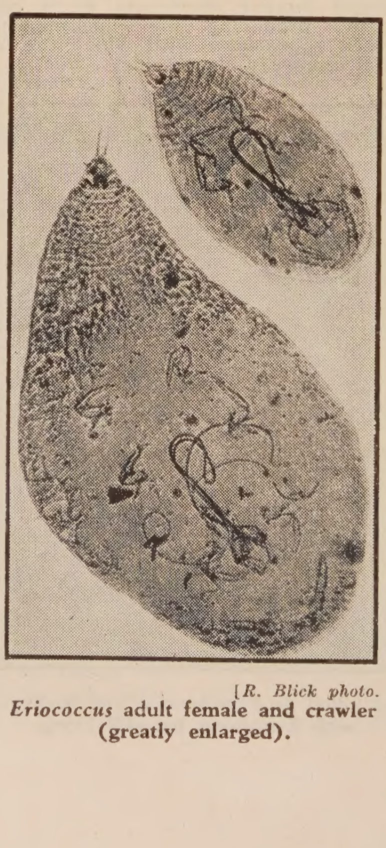
been divided on the question of whether definite action should be taken to spread the blight. The article published in 1946 stated that ". . . it is hard to find a live manuka bush or tree in South Canterbury." The article went on to say that to sportsmen manuka scrub is the home of wild pigs, deer, and pheasants, but to farmers it is a pest and a continual drain on farm expenditure because of the cost of controlling it and the loss of grazing involved.

Following the recent publicity, many opinions have been expressed concerning manuka blight. Some suggest that it would be a panacea for hill-country farmers; others state that, because manuka is a cover crop for regeneration of native bush and for forestry purposes, it should not be destroyed. Again, manuka grows on sour soils and on much reverting hill country. When it is removed the land is subject to erosion or invasion by other weeds. Further, in places manuka provides one of the main sources of firewood for the domestic requirements of neighbouring towns.

The whole question of the eradication or preservation of manuka is complex. To farmers, particularly those on second- or third-class hill country, it is a nuisance and a source of financial worry and as such should be destroyed in the cheapest way possible, but the soil-erosion, weed-invasion, and firewood-supply aspects suggest that caution should be observed when considering the deliberate spreading of blight for eradicating manuka.

Though all manuka scrub is similar in general appearance, close examination shows that two species of the genus *Leptospermum* occur: Manuka or red manuka (*Leptospermum scoparium*) and kanuka or white manuka (*Leptospermum ericoides*). Both species vary in size from short, whippy saplings to trees, but the following descriptions set out their broad botanical differences:—

Manuka has a varied growth form, from stunted bushes 3 to 4ft. high to trees of 20 to 25ft. high. It can be distinguished most easily by the seed capsules, which are about ¼in. to 1/3in. in diameter, and by the leaves, which have sharp points, so that the foliage is harsh to the touch. It should be noted that the term "red" refers to the wood, not to the colour of the flowers, as both red and white flowers occur within the species.



[R. Blick photo.

***Eriococcus* adult female and crawler (greatly enlarged).**

Kanuka often grows into trees of up to 20 to 60ft. high. It has a small elongated capsule of 1/16in to ⅛in. in diameter; the leaves are not sharply pointed and are soft to the touch. The leaves are usually narrower than those of manuka.

Broadly, manuka is more widespread than kanuka and occurs at higher altitudes or where the soil is infertile, sour, and wet or where the country is swept by strong winds. Kanuka favours the more-fertile, sheltered, warmer areas of lower altitude. Thus in the coastal areas of North Auckland, the Bay of Plenty, and Gisborne kanuka tends to be the dominant species, but in the Central Plateau, in the back country of Taranaki, and in inland Hawke's Bay manuka is dominant. In the South Island the position is similar. Kanuka tends to be dominant in the warmer areas of coastal Nelson and Marlborough and in sheltered areas further south such as at Peel Forest, while manuka is commoner at higher altitudes such as in the Awatere River Valley or in colder areas such as the foothills of the Southern Alps in Canterbury and Otago and on infertile or swamp country in Central Otago and Southland.

Types of Scale Insects Found

During the survey to ascertain the distribution of manuka blight 5 species of scale insects were found on both manuka and kanuka; they were a species of *Eriococcus*, *Coelostomidia wairoensis*, *Ctenochiton flavus*, *Inglisia leptospermi*, and *I. ornata*. The first 2 are soft scales or mealy bugs and the last 3 hard scales (because of their tough coatings).

The insect of the *Eriococcus* genus associated with the death of manuka is a mealy bug which forms tiny white mealy scales up to 1/32in. long and 1/64in. wide. The insect itself is pinkish and the mature female, which is sluggish or non-motile, remains in the mealy scale.

The life history and depredations of this insect are being studied by J. Kelsey and J. M. Hoy, of the Entomology Division, Ashburton, who state (4):—

> . . . the life cycle of the insects is not known for certain and it is possible that there may be more than one generation each year. Eggs are present from March to July. They are laid in clusters by the parent while still beneath the protective covering; the parent then dies. The small active insects emerging from the eggs are known as "crawlers" and this is the dispersal stage to new areas. Since they are wingless they must rely for dispersal on their 3 pairs of legs. On finding areas where bark is relatively thin on young manuka growth the crawlers squeeze beneath the flaky bark, insert their rostrums or sucking mouth parts into the sap stream, and commence to feed. Once this position is taken up they apparently only move if forced to do so by removal of the bark or their own protective cases.

The term mealy bug is derived from the waxy covering possessed by these insects and in some species this becomes a thick shell which forms an effective protection to the insect beneath.

The male is the only winged form among the mealy bug group of insects and it is the fact that females are wingless that prevents more rapid spread of the blight.

During feeding the mealy bugs secrete a clear, sweet, sticky liquid known as honey-dew which falls on to leaves and twigs below feeding points. On the honey-dew a black sooty mould grows and it is this that gives the characteristic black appearance to infected trees and shrubs.

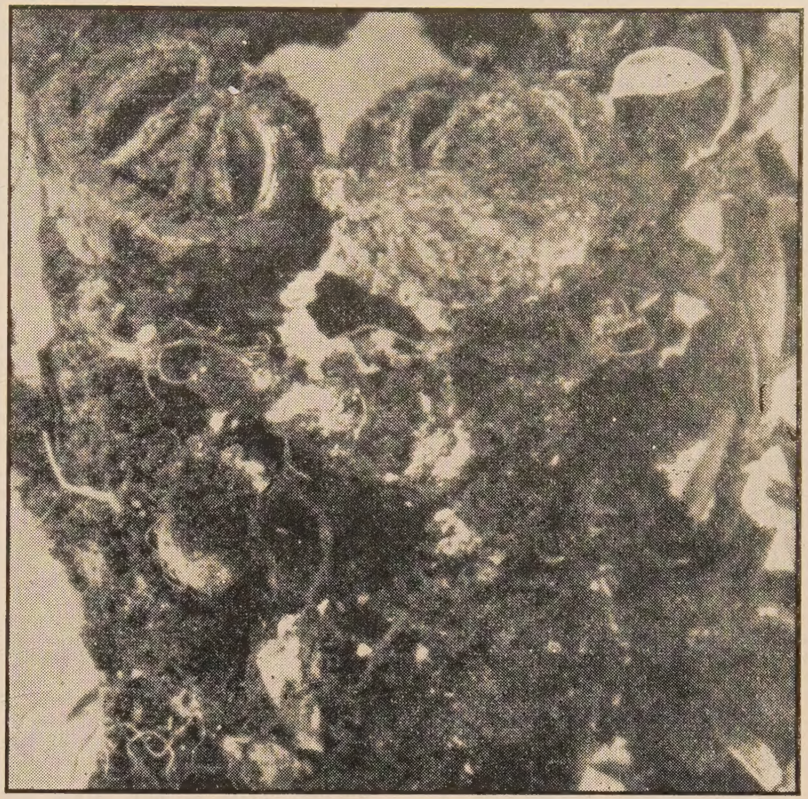
On infected plants in the field *Eriococcus* insects can be seen most easily on the underside of twigs where there is little accumulation of honey-dew and mould. The other scale insects found on manuka and kanuka had no apparent effect on plant growth. The hard scales *Ctenochiton flavus, Inglisia leptospermi,* and *I. ornata* were sparsely distributed, occurring in limited colonies on the west coast of the South Island and in the North Island. The other soft scale, *Coelostomidia wairoensis,* has a wide distribution and occurs principally on kanuka and to a less extent on manuka in the warmer, sheltered, and humid areas in the North Island and in isolated areas in the South Island as far south as Peel Forest. It is a larger insect than *Eriococcus* and forms mealy scales up to ⅛in. or 1/16in. long and about 1/16in. to ⅛in. wide. The insect inside the mealy scale is red and forms a long filamentous protuberance which projects through the sooty mould. This mould is like fine moss and differs from that associated with *Eriococcus,* which is shapeless and to the casual observer resembles black flour. Very often masses of "cotton," which are the male cocoons of *Coelostomidia wairoensis,* can be found under the loose bark of the trunks of trees. *C. wairoensis* should not be confused with *Eriococcus.* Though quantities of sooty mould festoon the branches and twigs of trees infested with *C. wairoensis* and make them unsightly, they appear to grow normally and no widespread dying occurs.

Sooty Mould on Other Plants

The characteristic blackening of the leaves, twigs, and branches of plants by sooty mould is not confined to manuka and kanuka. It has been recorded on many native trees and shrubs, including mingimingi and karamu (*Coprosma* spp.), matipo (*Pittosporum* spp.), pohuehue (*Muehlenbeckia* spp.), mountain beech (*Nothofagus cliffortioides*), rangiora (*Brachyglottis* spp.), tutu (*Coriaria* spp.), and tauhinu (*Cassinia* spp.). Though in many cases the mould is unsightly, no widespread mortality among trees and shrubs other than manuka has been recorded.

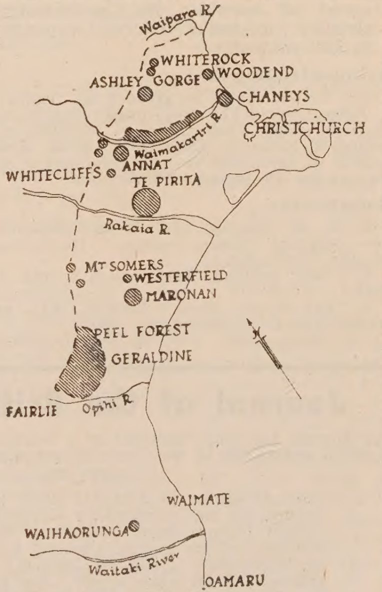
Distribution of Blight

Between June and September, 1948, the author made a survey through areas infested with manuka in the North and South Islands to ascertain the distribution of blight and its effect on plant growth. The accompanying map indicates the distribution of *Eriococcus* in Canterbury.



[Photo News Ltd. photo.

Manuka twig (considerably magnified) showing the sooty mould and some of the white mealy coverings of *Eriococcus* on capsules and stem.



Approximate distribution of manuka blight. The dotted line shows the locality chiefly affected; the shaded portions show some of the main areas of infestation.

[*Map drawn by the Head Office, Department of Lands and Survey, Wellington.*

Eriococcus appears to be confined to Canterbury. It was located in the foothills from Fairlie to the Okuku Range, at Amberley, on the Canterbury Plains on the north bank of the Waimakariri River from Kaiapoi to Burnt Hill, on rolling downs behind Annat, and at Te Pirita, Maronan, and Westerfield. Further centres of infestation have been reported from Waihaorunga (to the west of Waimate), from Cheviot, and from Kaituna Valley on Banks Peninsula. At Mt. Somers *Eriococcus* occurred at 1550ft., the highest altitude recorded.

Almost wherever manuka occurs between Fairlie and the Okuku Range below an altitude of 1500ft. and in other areas already mentioned dead and dying plants infested with *Eriococcus* are to be seen.

The occurrence of *Eriococcus* does not seem to be related to particular soil or climatic conditions, since infestations were found on light, stony, windswept areas at Te Pirita and Maronan and on heavy, wet, clay land of the foothills at Whitecliffs.

Trees up to 10ft. high have been killed, but the most susceptible plants are those 3ft. high. The exact cause of the death of the manuka is not known, though many suggestions have been made. Investigations are being carried out by the Entomology Division.

Eriococcus also attacks kanuka, but it was noticed that in only a few instances had plants died. In most cases some kanuka bushes were growing in association with manuka and these were found as living but blackened trees amid dead and dying manuka.

No *Eriococcus* was found in the North Island.

C. wairoensis occurred on kanuka and to a less extent on manuka in sheltered areas in North Auckland, the Bay of Plenty, Gisborne, Rotorua, and south-western Wairarapa. Isolated infestations occurred in the South Island in Nelson, Marlborough, and at Peel Forest. Practically all trees infested with *C. wairoensis* appeared to be growing quite normally; in two places only had infested manuka and kanuka trees died—at Tolaga Bay and south of Whakatane. In each instance only two trees had died, which was of no significance, as adjacent infested trees appeared to be growing normally.

Dispersal of Blight

Several farmers who had endeavoured to establish *Eriococcus* with a view to eradicating manuka on their properties were interviewed in the course of the survey. In none of the places inspected had it spread from introduced infested material. In one instance only, according to report, introduction apparently had been successful, though this will have to be confirmed by the identification of infected material.

The staff of the Entomology Division at Ashburton state that there are two methods of transference for the introduction of *Eriococcus* (4). "The period over which transfer can be carried out most effectively is during the 'crawler' stage of mealy bug development," says their report. "This stage is present in Canterbury from May to September. During this period transfer may be brought about by sending closely-wrapped parcels of the infested branches and on arrival placing these among branches of uninfested manuka or by sticking infested twigs into ground at the base of and in contact with the trees. The other method that could be adopted at any time of the year is to shift whole infested shrubs with a good ball of soil round the roots. In this method it is necessary to ensure that the shrubs do not receive a setback either during transplanting or after replanting. If the trees wither, the chances of the mealy bug establishing are extremely remote."

[*R. Blick photo.*

***Coelostomidia wairoensis* infesting kanuka. Note the moss-like appearance of the fungus.**

Conclusions

Manuka is attacked and killed in all stages of growth by *Eriococcus*, and since seedling growth is killed, the scale may be a possible means of eradicating manuka.

The life history of the insect is being studied at Ashburton, but as yet knowledge of it is incomplete. Until the life history and habitat of *Eriococcus* are known and introduction trials in new areas are conducted, recommendations concerning the effectiveness of the insect as a means of controlling manuka in other areas cannot be given. However, throughout the areas of manuka in Canterbury already infested *Eriococcus* appears to kill manuka.

Acknowledgments

The writer wishes to express his thanks to J. Kelsey and J. M. Hoy, of the Entomology Division of the Department of Scientific and Industrial Research, Ashburton, for the identification of specimens and for information concerning the life history of *Eriococcus*.

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New Contract Prices for Meat, Butter, and Cheese

AN increase of 7½ per cent. on present contract prices for meat supplied to the United Kingdom Government was announced recently by the Minister of Marketing, Mr. E. L. Cullen.

Mr. Cullen said that there had been negotiations between the United Kingdom Ministry of Food and Mr. F. P. Walsh, representing the New Zealand Government, and Mr. J. D. Ormond, representing the New Zealand Meat Producers' Board. The long-term contract entered into last year between the two Governments provided for annual discussions on price and for price adjustments not exceeding 7½ per cent. upward or downward in any one year.

"It is very gratifying indeed," said Mr. Cullen, "that it has been possible to reach agreement on prices for the coming season at the maximum level allowed by the contract. The long-term contract has given New Zealand farmers an assurance that they can plan for increased meat production with the knowledge of a secure market. This latest increase in prices will, I am sure, be an added stimulus to farmers to produce the additional meat which the United Kingdom needs urgently. The Government's recent announcement regarding the fertiliser subsidy shows that it stands behind the farmers in their drive to increase production."

He added that he was pleased to learn that the Dairy Products Marketing Commission had also negotiated with the Ministry of Food an increase of 7½ per cent. in the butter price and an equivalent increase in the cheese price, and had also reached agreement with the Ministry concerning long-term contracts for the sale and purchase of the Dominion's exportable surplus of milk powder.

The dairy produce prices agreed upon are 252s. 6d. sterling a cwt. f.o.b. for butter and 141s. 6d. sterling a cwt. f.o.b. for cheese. The present prices are 235s. sterling a cwt. f.o.b. for butter and 133s. sterling a cwt. for cheese, and the new prices therefore represent an increase of 17s. 6d. sterling a cwt. for butter and 8s. 6d. sterling a cwt. for cheese. Other terms and conditions under the long-term contract remain unchanged.

Journal of the British Grassland Society

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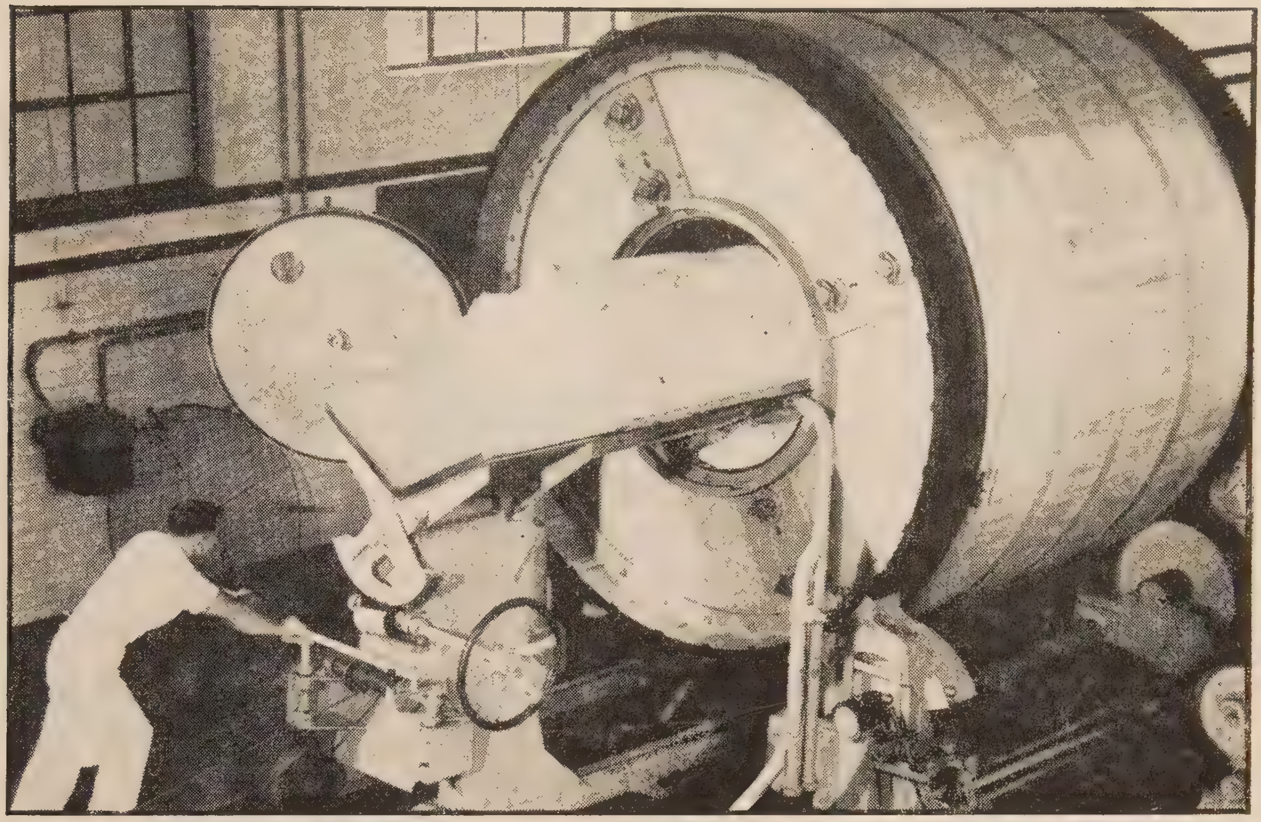

FARM DAIRY INSTRUCTION: QUALITY FAULTS

By W. G. BATT, Supervisor of Farm Dairy Instruction,
Department of Agriculture, Hamilton.

QUALITY faults in milk and cream are described by the dairy industry as flavours. Each flavour is named for convenience and each has one or more causes. It is necessary for the producer to know the causes of these flavours so that if his produce is affected, he can take the required steps to remedy them and thus improve quality.

MILK and cream and the products manufactured from them which are of good quality are referred to in the industry as being "clean" in flavour. This means that the flavour of the product is natural and not affected by anything foreign. The term "unclean flavour" which may be applied does not necessarily mean that the product is unclean, but that its flavour is affected by something unusual or foreign.

Most quality faults in milk and cream have their origin in equipment ineffectively cleaned and infested with bacteria, but such contamination itself may produce different faults and flavours by the action of different classes of bacteria. The acid-forming and non-acid-forming groups of bacteria are opposite in their effect, and although both may be manifest in a milking machine or other equipment, the acid-forming group will produce an entirely-different condition and fault in milk and cream than the non-acid-forming group. The treatment advised by the Farm Dairy Instructors will vary to suit whichever group is prevalent.

Milk and cream are so susceptible to the absorption of foreign odours and offer such perfect media for the growth and development of bacteria that the producer has to contend with a very large number of unsatisfactory flavours. These are produced from a wide range of conditions and have a number of causes, but they will affect, and sometimes destroy, the fine flavour and keeping quality of the manufactured product.

Common Flavours

The common flavours found almost daily in dairy factories are set out below, together with the usual or common causes and recommended remedies.

Unclean Flavour (Direct Contamination)

Cause: Milk or cream coming in contact with dirty equipment, chiefly yellow slime, or being placed in cans pitted or dirty. The flavour is sharp and unclean and acidity develops rapidly.

Remedy: Clean conditions and effective sterilisation.

Unclean Flavour (Absorption)

Cause: Milk or cream absorbing the smell of cow yards, unsatisfactory shed surroundings, manure heaps, leaking skimmed-milk pumps, sour concrete, etc.; dust which arises from cows, yards, and dairy premises being drawn into the milking machine, cooler, or separator; absorption of unclean air from dirty air systems and vacuum tanks of milking machines; cream being left overnight in impure air. Any smell prevailing in or near the dairy premises will be absorbed.

Remedy: Ensure a clean and pure air supply to the dairy and milking machine, if possible, from grassed surroundings. Remove any possibility of dust or smell reaching the milk or cream during production or while awaiting delivery.

Unclean Flavour (Milkstone)

The flavour from milkstone is unclean, but is inclined to be less sharp than that from other sources.

Cause: Encrustation of milkstone is a definite cause of poor quality, because it harbours bacteria and imparts a characteristic flavour. By providing a rough, uneven sur

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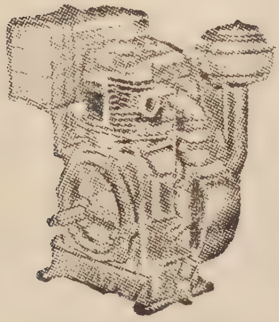

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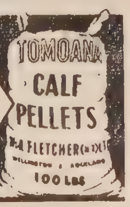

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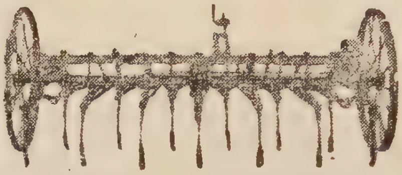

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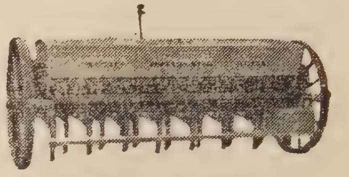

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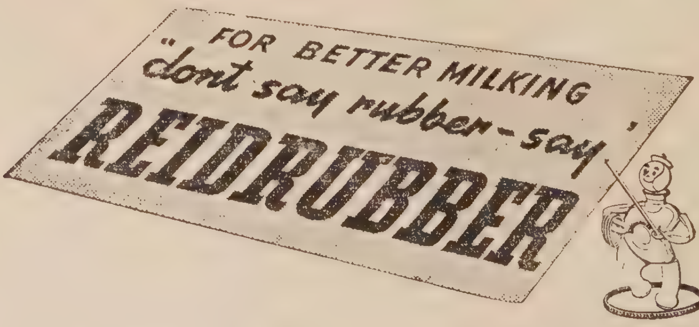

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face it also causes milk deposits to accumulate which will provide food for bacteria and thereby bring about contamination.

Remedy: Remove all trace of milkstone and mineral stone and maintain a smooth metal surface free from any obstruction. The methods to apply will be discussed in another article in this series.

Unclean Flavour (Separator and Tinware, etc.)

Cause: A number of unclean flavours have causes other than the usual one of yellow slime. Separator discs and tinware coated with white slime give an unclean flavour exactly like the smell of the metal when in this condition.

Remedy: Clean equipment thoroughly and sterilise it with boiling water. Because all milk and cream during separation must pass through the discs, contamination from this source can be intense.

Fermentation

Direct cause: By milk coming in contact with sour or perished rubbers or sour milk deposits in equipment.

Indirect cause: By milk or cream absorbing the smell and bacteria from fermented skimmed milk held too close, leaking skimmed-milk pumps, and sourness in concrete of separator room and in woodwork. Where one of these conditions is the only contaminating influence the fermentation will be more rapid and definite. Skimming a cream too thin in consistency will accelerate this condition. An insanitary means of skimmed-milk disposal causes intense contamination, particularly in hot weather.

Remedy: Replace all perished and sour rubbers and remove any possibility of sourness or fermentation from skimmed-milk disposal, concrete, or any other source reaching milk or cream, either direct or by absorption. Produce a cream of good consistency. The smell and bacteria from containers of fermented skimmed milk will affect dairy produce seriously even if held some distance from the dairy premises.

Bug Flavour

Bug flavour is so called because its smell is similar to that emitted by the "Maori bug."

Cause: Dry yellow slime on separator parts and utensils; smell from woodwork impregnated with milk deposits; keeping tinware on benches so impregnated; dry cloths and floors impregnated with milk deposits; dry yellow slime on floors and woodwork of separator room and in milk and cream cans.

Remedy: Ensure the utmost cleanliness in cans, tinware, concrete floors, walls, and woodwork. Remove wooden benches from releaser rooms and keep tinware and utensils in the open air.

Rancid Flavour

Cause: In daily supply: Milk or cream coming in contact with rancid milk deposits or absorbing the smell of such deposits. In infrequent deliveries: Certain types of bacteria from unclean sources which develop in the cream.

Remedy: Clean thoroughly and sterilise all parts of the milking machine and equipment. Remove from the vicinity of the dairy premises all containers and vessels which have a rancid smell and all rancid milk deposits from the woodwork and floors.

High Acidity

Cause: An excessive development of acidity in both daily and alternate-day collections produced by unclean equipment and cow yard dust and smells. Where cream is not consigned daily a common cause is keeping cream in separator rooms poorly ventilated and too close to yards. Skimming a cream too thin accelerates the development of acidity. Perished rubbers on milking machines are a frequent cause.

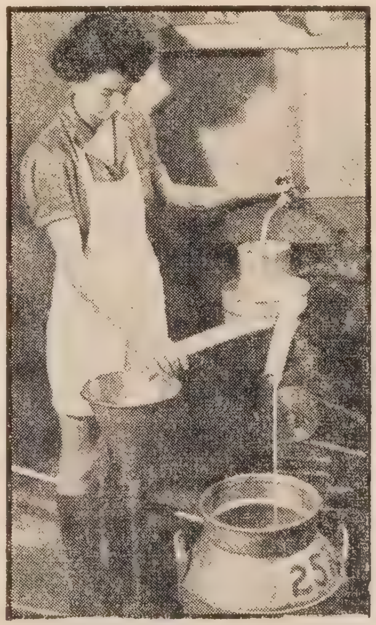
Remedy: Ensure the utmost cleanliness of equipment. Replace all rubber which has a perished inside surface. Ensure a clean air supply to the milking machine, cooler, and separator. Skim a cream of good consistency, especially in hot weather. In infrequent deliveries keep cream awaiting delivery in pure, clean air and away from the dairy premises.

Ropy Milk or Cream

Milk or cream which lifts in strings is known as "ropy."

Cause: Generally produced by non-acid bacteria which, developing under the leaves of grass and plants in places where water has stagnated, gains access to milk from cows' legs, tails, and udders during milking and stripping.

This bacteria will cause protracted trouble if it becomes established in milking machines (under milkstone, rubber rings, etc.), concrete floors, and walls or in concrete water tanks. Ropiness is exclusive to warm weather and generally disappears after heavy rain. It is a difficult bacteria to control and extra sterilisation methods are needed. To control some difficult cases it may be necessary to introduce clean, acid-forming bacteria to a milking machine. Bad shed surroundings of many years' standing are an infrequent and more remote cause of this trouble.



[*National Publicity Studios photo.*

As most quality faults in milk and cream have their origin in ineffectively-cleaned equipment, the utmost cleanliness in the dairy is essential.

Remedy: Remove the possibility of cows grazing in marshy plots or anywhere where water has stagnated. Cleanse cows' udders, etc., thoroughly with a chlorine wash. If this does not remove the fault, assistance should be sought from the local Farm Dairy Instructor, who will introduce extra sterilisation methods to the milking machine and equipment, the dairy premises, and concrete water tanks or, if necessary, introduce acid-forming bacteria.

Slimy Milk or Cream

Slimy milk or cream is generally a minor condition of ropiness and is usually non-acid.

Cause: Cows grazing in types of marshy ground; bad and very old shed surroundings; separators too small for the quantity of milk handled; flushing separator bowls with hot water.

Remedy: The first two causes should be treated as recommended in dealing with ropy milk and cream. The separator must be of sufficient capacity; otherwise some of the separator slime collected by the discs will be discharged into the cream. Separator bowls should be flushed with skimmed milk.

Cowy Flavour

Cause: The heated or bloated condition of cows generally in spring months; not cooling; the strong smell of cows on spring pastures drawn into the milking machine or separator; cows frightened and nervous; cows heated by fast travelling just before milking.

Remedy: Ensure that cows are driven to the dairy premises quietly and are not in a heated condition before milking. Observe a quiet shed technique. Ensure adequate ventilation of the milking shed and releaser room with air from a clean source. Arrange the dairy premises so that the prevailing wind will convey odours away from the milking machine and separator room. Cool all milk and cream thoroughly with an efficient cooler and in pure, clean air.

Cow Yard Flavour

Cause: The unclean smell of unwashed yards, manure heaps, and drainage absorbed by milk and cream through the milking machine or at separation; keeping cream overnight too close to these conditions; dust arising from such unsatisfactory surroundings. Cow yard flavour is more common in humid weather.

Remedy: Ensure a pure, clean air supply by removing the sources of contamination and providing grassed shed surroundings. In planning a new milking shed or reconstructing an existing one be certain to arrange the layout to ensure that the prevailing wind will carry dust from the traffic of cows and the smell of surroundings away from the dairy premises. The releaser room should always be at the point of the prevailing wind. The air intake of the milking machine is very great and such air must always be from a clean source. Keep milk and cream overnight in clean air and away from cow yards.

Feed Ferment

Cream affected with feed ferment ferments rapidly and its flavour is very sharp and bitter.

Cause: Feed flavour and unclean conditions combined, generally occurring in spring months. *Lotus major*, some clovers, and trefoil are feeds most likely to cause this condition.

Remedy: Ensure proper cleanliness and thorough sterilisation of equipment. Keep cows from swamp country until the quality fault is removed. Remove all sour conditions. Produce a cream of good consistency.

Dishcloth Flavour

Cause: Stale rags impregnated with stale milk used on utensils, as milk strainers, or in washing cows' teats; untinned and pitted claws and droppers on milking machines. This flavour is also caused by some classes of contaminating deposits on woodwork where utensils are kept and by some classes of contamination which develop on cans and utensils, especially if the metal is pitted.

Remedy: Destroy stale rags and use clean cloths sterilised daily for washing udders; use brushes for cleaning metal. Ensure that the woodwork of benches which store tinware is thoroughly clean. Ensure that all cans, utensils, and parts of milking machines are properly coated with tin. With the exception of stainless steel, the metals used in dairy equipment are porous and harbour bacteria unless completely tinned.

Oxidation

Cause: Cream too thick in consistency; the effect of milk deposits on porous brass fittings such as vat faucets; the effect of sunlight on cream or on deposits of milk on tinware; greasy tinware, especially separator discs, kept in sunlight.

Remedy: Skim cream of reasonable consistency (from 40 to 45 per cent. of fat in hot weather and 38 to 40 per cent. in cooler weather). Replace brass fittings with ones properly tinned. Keep milk and cream protected from sunlight. Remove all trace of grease and fat from tinware and then sterilise the tinware thoroughly.

Sweet Curdling

Daily cream affected by sweet curdling is perfectly sweet and without acidity, but sets the same as junket. It is a condition more peculiar to the Auckland Province and is more apparent in humid weather.

Cause: A non-acid condition produced by bacteria from types of shed surroundings and concrete floors and walls.

Remedy: Improve the condition of shed surroundings. Sterilise concrete floors and walls thoroughly.

Tallowy

Cause: Cream too thick and the effect of strong sunlight and heat on the fats.

Remedy: Produce cream of reasonable consistency and protect it from sunlight and heat. Remove all grease and fat from tinware and then sterilise the tinware thoroughly.

Churned

In churned cream some butterfat is churned and coagulated and floats on the cream in lumps. It is very common in morning cream that has not been cooled, and is a hot-weather condition very prevalent in Auckland Province in summer, causing much loss individually to producers and collectively in manufacture. The flavour of such cream is affected by oiliness and by a metallic flavour due to agitation on the warm metal of cans during transport. In some cases butterfat is separated from the serum by agitation and floats like oil on the surface of the cream.

Cause: Skimming too thin and not cooling; causing too much shaking and friction with metal during transport.

Remedy: Efficient cooling and producing a cream of good consistency.

Flat and Insipid

Cause: Too much of the water used in flushing machines and separator being allowed to reach milk or cream; using water to warm milk or to flush the separator bowl; skimming too thin; cows in poor condition; poor pastures; the presence of non-acid bacteria in dairy equipment.

Remedy: Ensure that water used in flushing machines does not reach the milk vat. Use skimmed milk to flush the separator bowl. Produce cream of good consistency. If the presence of non-acid bacteria is suspected, communicate with the local Farm Dairy Instructor, who will advise extra methods of sterilisation or introduce clean acid-forming bacteria.

Metallic Flavour

Cause: Is usually caused in daily supply by cream too thin and not cooled being shaken severely on the warm metal of cans in transport. It is very prevalent in morning cream of daily supply and is accentuated by cans not being properly tinned.

Pitted or rusty metal of milking machines, cans, and utensils will also cause a metallic flavour. An indirect cause is the use of iron drums for storing whey or skimmed milk, which, though washed clean regularly, will give a strong metallic smell because of the action of acidity and this smell will be absorbed by the milk and cream if the drums are taken into the separator room.

Remedy: Ensure efficient cooling, especially of the morning's skimming. Produce a cream of good consistency to enable it to be transported with less agitation. Protect cream from the sun. Ensure that pitted or rusty metal in dairy equipment is retinned or replaced. Use a sanitary means of skimmed-milk disposal.

Stale Flavour

Cause: In cream other than that collected daily: Skimming a cream too thick in cold weather; keeping cream too long before delivery; unclean conditions in cold weather. In daily supply: Milk or cream coming in contact with stale milk deposits on milking equipment or absorbing the stale smell of any unsatisfactory condition near the dairy premises.

Remedy: Avoid methods which will cause the flavour. Produce a thinner cream in cold weather (38 to 40 per cent. of fat) to promote a little acidity. Ensure that milk or cream does not come in contact with anything stale or stale smelling.

Feed Flavours

Feed flavours can be divided into two main classes—temporary and permanent. Those which are temporary are caused by cows' grazing on the lush and succulent pastures of spring, a flush growth of grass after a dry spell, young grass of pastures recently sown, and a rapid growth of grass in paddocks recently cut for haymaking. Practically all grasses will give a feed flavour under these conditions and such flavours persist until the grasses become harder with more sunshine and drier conditions.

The hard grasses and paspalum, cocksfoot, and ryegrass produce good-flavoured cream, but in certain stages of growth even some of these give a feed flavour. During the main producing season of summer and autumn, however, these grasses produce a cream of good flavour. The clover family all produce strong feed flavour and considerable gas, and, in addition, *Lotus major*, trefoil, and lucerne impart a distinct bitterness to milk and cream.

Feed flavours resulting from these causes can be controlled by efficient cooling and aeration in a clean atmosphere and by removing the cows, if possible, to a pasture not so succulent or rank in growth.

The permanent feed flavours are those which are caused by cows' consuming feeds with a strong taste or smell, such as turnips, swedes, garlic, watercress, and land cress, and a small quantity of such feeds will produce a characteristic feed flavour at any time of the producing year.

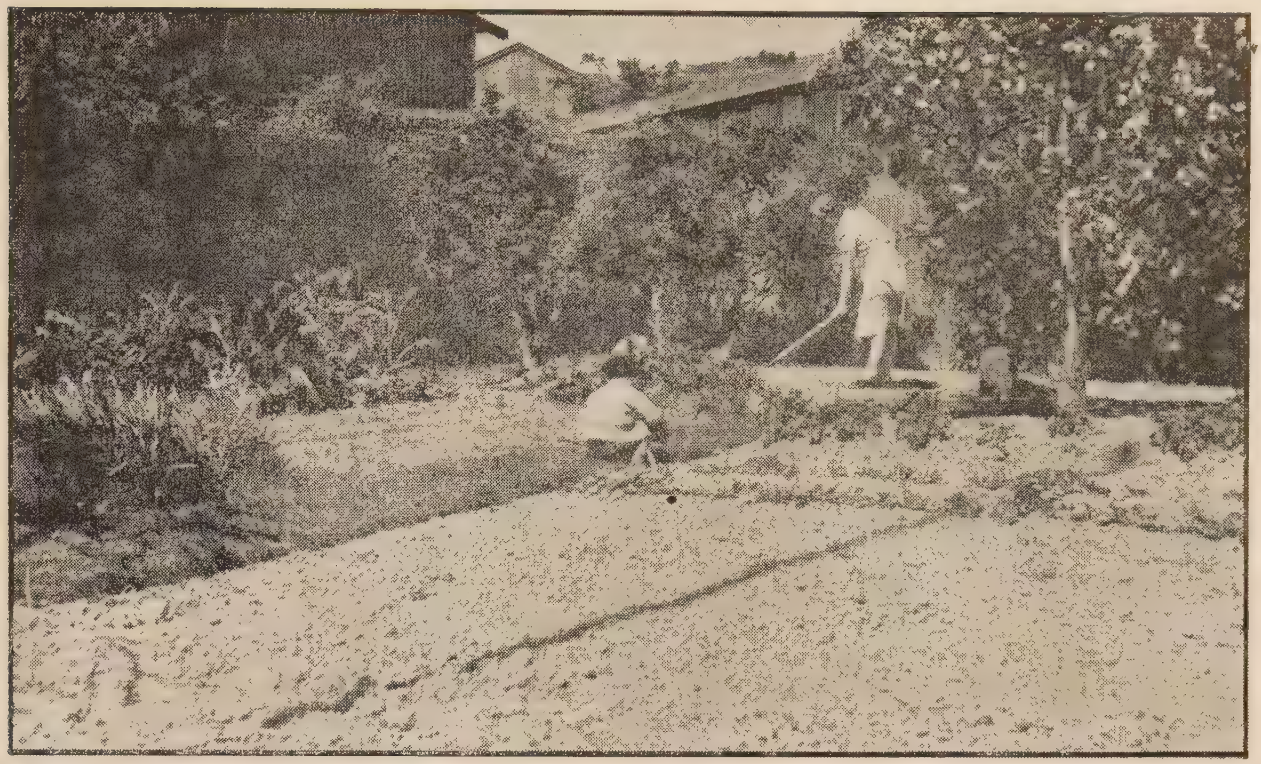
Generally the presence and extent of feed flavour depend on the quantity of tainting foods consumed by the cow in relation to the quantity of non-tainting foods. If cows are grazed exclusively on young grass, turnips, swedes, or cress-infested pasture, the feed flavour will be intense, but if they are grazed sparingly on these foods immediately after milking and are given a preponderance of hard non-tainting foods and grasses, the milk or cream will not be affected.

Land Cress Flavour

The flavour caused by cows' consuming land cress is one of the most serious, and the plant appears to be spreading. It usually grows in light soils and in poor swards, and especially in gateways and around water troughs. The flavour in cream is caused by the mustard oil of the plant and is very costly to treat at the factory. Cress-infested pastures should be treated to induce a better sward of grass and should be grazed sparingly. Where cows must be grazed on such pastures they should be allowed on them only in the mornings and should be removed to a cress-free short pasture at midday.

Turnip Flavour

Turnip flavour is an unsatisfactory quality caused by cows' consuming a preponderance of turnips, swedes, etc., at the expense of other feeds. Such feeds should be given only immediately after milking and the cows removed to pasture. Swedes and turnips should be wilted before feeding.



Busy Season in Many Gardens Starts in September

By A. G. KENNELLY, Vegetable Instructor, Department of Agriculture, Christchurch.

THOUGH there is always work to be done in most home gardens, a special effort is usually necessary in September. The month is regarded in many districts as the beginning of the busy season. The ground, even in the colder districts, has warmed sufficiently to enable the seed of all hardy plants to grow satisfactorily, and in a few of the more-favoured districts even frost-tender subjects such as dwarf and runner beans, pumpkin, marrow, squash, and cucumber may be sown outside.

IN general the most important work is seed sowing, but the setting out of plants raised from seed sown earlier will also be important in many gardens, as the setting out of well-grown plants now is the only way by which home gardeners in some districts can avoid the break in continuity of supply which is liable to occur after the finish of the winter and early-spring crops.

Tomatoes, celery, capsicum, Cape gooseberries, egg plants, melons, cucumbers, and celeriac can be sown under glass, though in most southern districts or where the last killing frost may occur as late as the first or second week in November there is no hurry yet to sow seed of cucumber, marrow, pumpkin, and squash for growing out of doors. Seed of brussels sprouts, leeks, and cauliflower can, however, be sown under glass or, where conditions are favourable, in the open.

Seedlings of lettuce, silver beet, summer cabbage, and cauliflower can be set out or gaps filled in earlier-planted crops. Early-planted potatoes will need protection from frost and a successional planting can be made, though, except in favourable situations, the planting of the main crop is best deferred until the first or second week in October.

Tubers of Jerusalem artichokes can still be set out and in exposed situations broad beans may require support. It can be provided by strings tied at suitable heights to stout stakes placed at 5 to 6ft. intervals along the sides of the bean rows. In many districts peas will need protection from birds. Netting or cotton stretched over the rows is effective, though a dusting of lime, superphosphate, or sawdust is sometimes satisfactory.

Maintenance of Fertility

Though soils vary in their capacity for continued high production, under continued cultivation all soils sooner or later begin to decline in fertility unless a programme is followed which includes such factors as rotation and the addition of suitable organic matter such as farmyard manure, preferably supplemented by artificial fertilisers. In the home garden, as elsewhere, the stage at which the decline is checked or the fertility rebuilt depends on the skill and knowledge of the cultivator and the facilities at his disposal.

Experienced gardeners appreciate the improvement brought about by the addition of organic matter to the soil. The average larger-sized, well-worked home garden in New Zealand could be kept in a state of high fertility by the addition annually of the best part of a ton of organic matter such as good-quality farmyard or stable manure. That means an annual dressing of about 7lb. per square yard to the larger-sized garden of about 1/16 acre and is much more than is practicable for a majority of home gardeners, most of whom have to rely on the growing and digging in of green crops and the digging in of garden and household residues available.

Shortage of organic matter for applying to the soil is not, however, a problem that is confined to home gardeners. It is also a problem in market gardens in most parts of the world where intensive production confined to restricted areas is coupled with the replacement in the area of animals by machines for most farm and industrial work. Not many years ago annual applications of good-quality stable manure at the rate of 20 or 30 tons to the

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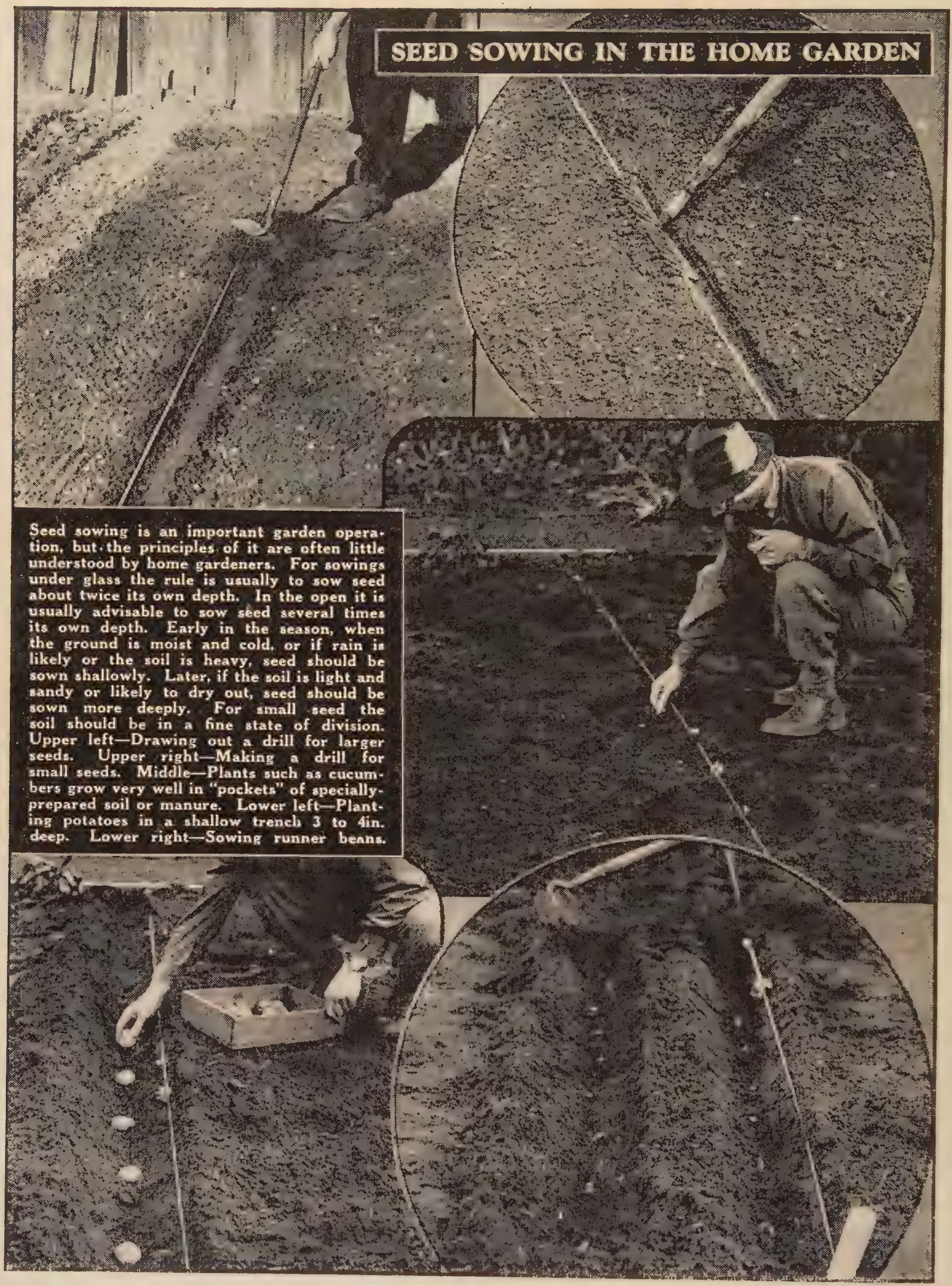
Photograph in heading by Green and Hahn Ltd.

SEED SOWING IN THE HOME GARDEN



Seed sowing is an important garden operation, but the principles of it are often little understood by home gardeners. For sowings under glass the rule is usually to sow seed about twice its own depth. In the open it is usually advisable to sow seed several times its own depth. Early in the season, when the ground is moist and cold, or if rain is likely or the soil is heavy, seed should be sown shallowly. Later, if the soil is light and sandy or likely to dry out, seed should be sown more deeply. For small seed the soil should be in a fine state of division. Upper left—Drawing out a drill for larger seeds. Upper right—Making a drill for small seeds. Middle—Plants such as cucumbers grow very well in "pockets" of specially-prepared soil or manure. Lower left—Planting potatoes in a shallow trench 3 to 4in. deep. Lower right—Sowing runner beans.

[Photograph at top right by Sparrow Industrial Pictures Ltd.; all others by Green and Hahn Ltd.

THE HOME GARDEN IN SEPTEMBER

[*Green and Hahn Ltd. photo.*

Broad beans mature at a time when vegetables are in short supply in many gardens. They are a good source of vitamins and are easily grown. The more-forward crops will now require support where weather conditions are boisterous. Small plants such as those above can be simply earthed up the stems if they require support.

acre (10 to 15lb. per square yard) and sometimes very much more were not considered exceptional and were in fact often regarded as the minimum necessary for maintaining fertility.

The steady but consistent decline in the amount of such organic manure available, together with a greater awareness on the part of the public of the nutritional value of vegetables and a consequent greater demand for more and better-quality vegetables, led to a considerable amount of research into the problem of the maintenance of a high standard of fertility on intensively-cultivated land. In general it has been found that where the soil is in reasonably good condition it is most economic to apply moderate quantities of farmyard manure (say, 3 to 5lb. per square yard annually) supplemented by artificial (usually mineral) fertilisers; in addition, many crops produce their highest yields when manured this way.

Supplementing Plant Nutrients

If the soil is adequately supplied with well-rotted organic matter, which may have its source as compost, green manure, garden residues, or animal manure, the home gardener should at this time of year consider to what extent it is advisable to supplement the plant nutrient reserves of his soil with artificial manures.

Where a considerable area of a particular crop is grown it is usual to apply those fertilisers that it is considered are most needed by it. However, in the home garden different crops are usually so closely spaced and the area of each often so small that the work of weighing and making up different fertiliser mixtures, which may or may not give optimum results on the particular soil to which they are to be applied, is usually rather tedious. Though almost every book on gardening recommends a different fertiliser mixture for each kind of vegetable crop, practically all recommendations differ to some extent; some differ very widely. Some are based on research or trials on a particular soil or range of soils and others on what particular range and ratio of nutrients it is considered are required by the crop to be grown.

Home gardeners can therefore usually save themselves much trouble and are unlikely to experience any reduction in yield if they apply a complete fertiliser to the whole garden at the beginning of the growing season and confine to side dressings any later applications of fertiliser that may be considered necessary.

The "complete" fertiliser is complete only as far as it contains the principal plant nutrients, nitrogen, phosphoric acid, and potash. However, it is very important that there should be a reasonable balance between the three. On most New Zealand soils the following will give good results: 7lb. of sulphate of ammonia, 21lb. of blood and bone, 14lb. of superphosphate, and 6lb. of muriate of potash or preferably sulphate of potash.

The ingredients should be well mixed and the mixture applied at the rate of 1lb. to 10 sq. yds. The soil should first be dug and the mixture then raked or lightly forked in. Thus, about 30lb. would be needed for a 1/16 acre garden (that is, an area about 60 x 50ft. or 90 x 30ft.). The remainder can be used to dig in extra dressings to potatoes or tomatoes or to top-dress crops such as spring cabbage.

The total amount of mixture can be reduced or increased proportionately according to the size of the garden, but the relative amounts of each ingredient should remain the same unless it is desired to alter the ratio of the essential elements. That is not advised, however, unless the home gardener has certain essential information about his soil and the needs of the particular crops he intends to grow.

Applying Fertilisers

Following is a useful table for comparing fertiliser applications in home gardens with those for larger areas:—

Fertilisers per acre cwt.	Equivalent rate per sq. yd: oz.
1	0.37
2	0.74
3	1.11
4	1.48
5	1.85
6	2.22
7	2.59
8	2.96
9	3.33
10	3.70

Asparagus

Established asparagus beds should be kept free from weeds and may be fed with liquid manure. Liquid manure made from organic material such as farmyard or poultry manure is excellent, not the least of its advantages being its safety of application. As an alternative nitrate of soda or sulphate of ammonia applied at the rate of 1oz. per square yard and watered in will give good results. Dried blood is sometimes used, but apart from the fact that there is more delay at this time of year than is desirable before it breaks down and the nutrients it contains become available, on light sandy soils lacking in organic matter late dressings of dried blood sometimes give a rather musty flavour to the shoots when cooked.

It is not too late to plant new asparagus beds, and in the south conditions are often more conducive to growth in September than in August. The ground should be prepared by being deeply dug and cleared of weeds. Good drainage is essential and field drains should be installed if the condition of the ground warrants their use.

Though asparagus succeeds in soil deficient in organic matter, young plants establish better in beds that have been dressed with well-rotted organic matter some time before planting. One-year crowns are best. Plants should be set out as advised in last month's "Journal."

Broad Beans

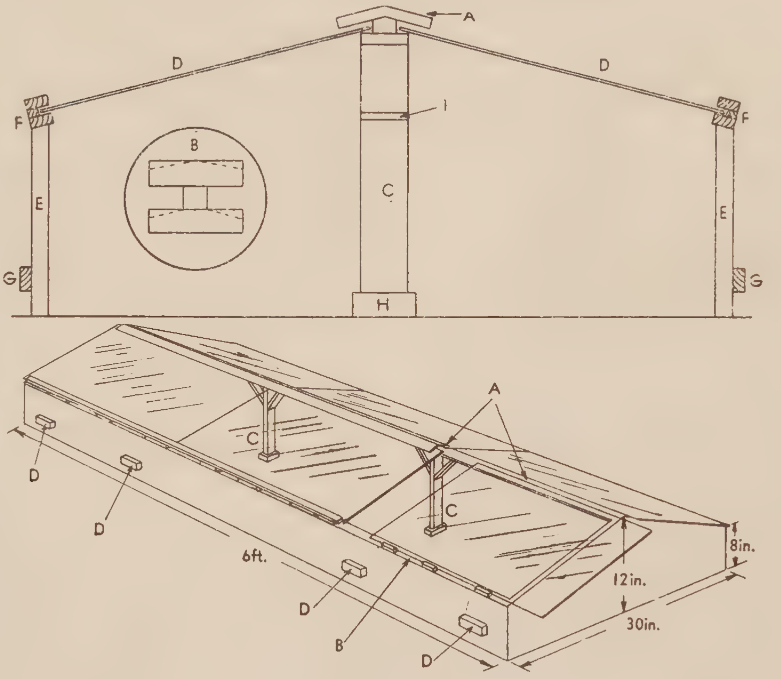
Broad beans will succeed in most well-drained, fertile soils that do not dry out. Though primarily a cool-weather vegetable, broad beans can still be sown in most districts. They will not thrive if the soil is sour, and if necessary, lime should be applied at the rate of at least 2 to 4oz. per square yard. Lime is best applied some time before sowing.

THE HOME GARDEN IN SEPTEMBER . . .

Broad beans do well in a fairly heavy, well-drained soil that has been thoroughly cultivated and into which has been dug a moderate supply of well-rotted organic material such as compost or farmyard manure. The ground should be deeply dug well before sowing. Yields are usually increased where the organic matter in the soil is supplemented by a complete fertiliser (one containing nitrogen, phosphoric acid, and potash) applied at the rate of about 2 to 3oz. per square yard, though on many fertile soils in New Zealand superphosphate alone, used at the rate of 2 to 4oz. per square yard, has proved satisfactory.

Beans should be sown in double rows about 10in. apart with the seed "staggered" or placed in diagonal pattern about 4 to 6in. apart and about 2in. deep in a shallow trench usually about 3in. deep. A trench is not essential, but one is easily drawn out with a hoe and is useful where it is intended to earth the plants up later, as the greater planting depth will enable plants to be stabilised better.

AN EASILY-MADE GARDEN FRAME



A serviceable and simply-constructed garden frame can be made quite cheaply by any home gardener who is handy with tools. Such a frame would repay the keen gardener for his expenditure of time and money by the interest it would add to his garden work, even apart from the increased possibilities it would afford of raising and maturing crops. The estimated cost of a frame of the type shown above, excluding the cost of preservative or paint, is £3.

The timber required for a frame 6ft. long is 22 lineal feet of 8in. x ¾in., 32 lineal feet of 2in. x ½in. batten if the ridge is built as at A in the upper diagram or 26 lineal feet if it is built as at B, 6 lineal feet of 1in. x ½in., and 6 lineal feet of ½in. x ¼in. The timber should be reasonably dry. Pine is quite satisfactory if oil-soluble wood preservatives such as zinc or copper naphthenate or pentachlorphenol (available in proprietary preparations) are brushed on; a soaking for 20 minutes is preferable.

Upper: A—Ridge made of 2in. x ½in. batten. The top consists of two lengths of batten joined at an angle and fastened to the bottom piece of batten by 1in. x ½in. timber. B—Alternative simpler type of ridge made from two lengths of 2in. x ½in. batten joined by 1in. x ½in. timber. If the sides are bevelled as shown, the depth of the joining piece can be halved. C—Support batten of 2in. x ½in. timber. D—24oz. glass sheet with an overlap of about 1in. at each end. E—Sides of 8in. x ¾in. timber. F—Side supports for glass made of two lengths of 1in. x ½in. timber joined at intervals by 4in. lengths of ½in. x ¼in. timber. G—Piece of wood ¾in. x ½in. and 4in. long for lifting the frame. H—Foot for the supporting batten. I—Brace from the supporting batten to the ridge.

Lower: A—Ridge cut away to show glass resting on ridge. B—Top of side support removed to show the 4in. lengths of timber for holding glass in position. The gaps are necessary to enable rain-water to drain away. C—Supports for ridge, each with a foot to prevent the support penetrating the ground. D—Pieces of wood ¾in. x ½in. for lifting the frame.

Two main types of broad bean are grown in New Zealand: The broad-podded or Windsor type and the long-podded type. Examples of each are Broad Windsor and Early Longpod. The long-podded varieties are earlier, though the broad-podded varieties are usually considered to have a better flavour. Small-podded varieties are also sold by some seedsmen. They may be tall or dwarf, but as the tall varieties are low yielding and do not have the advantages of compactness and ability to resist boisterous conditions, only the dwarf or fan-podded varieties can be recommended.

Carrots

Seed of carrots should be sown as soon as soil conditions are favourable. Several small successional sowings are preferable to one large one in most home gardens. Carrots are easy to grow and are high yielding. They thrive in deep, rich, well-drained, and well-cultivated soils that contain adequate well-rotted organic matter. When sown thinly on light, free-working, sandy loams or peat soils they do not require thinning. Where thinning is necessary it can often be delayed with advantage until the plants are large enough to be used in soups, salads, or stews.

Where the carrot rust fly is troublesome sowing should be arranged so that it falls between the main egg-laying periods. Care must be taken, too, to refirm the soil after thinning and to water the remaining roots copiously and remove all traces of thinnings. The maggot, which damages the roots, is very difficult to control and a repellant such as horticultural naphthalene should be dusted on the foliage and 6in. on either side of the rows at the rate of 4oz. to 20ft. of row at intervals of 10 to 14 days to keep away the egg-laying fly. It should be applied regularly, as it is volatile, but application should be stopped 14 days before harvesting or there may be some residual flavour of naphthalene after cooking.

The rust fly should not be confused with aphides, which are green or light green and usually very numerous. They may be wingless or have transparent wings. They suck the sap and stunt the growth, so that young plants may wilt in hot weather. Many tiny white specks present are the cast skins of the aphides. The foliage may take on a bronzing or a bluish or reddish hue and the petioles become distorted.

Aphides are easily controlled by regular spraying with nicotine sulphate 1:600 (1oz. of nicotine sulphate to 4 gallons of water) plus 2oz. of soap, which should be dissolved in a little hot water first. The leaves of the carrots must be thoroughly covered with spray. A still and preferably warm day should be chosen for spraying if possible.

Though carrots thrive in deep, rich, well-drained, and well-cultivated soils, care should be taken when building up the humus content to apply only well-rotted material in limited quantity so that when incorporated it forms a homogeneous mass with the soil; otherwise misshapen or forked roots may result. Manure should be well rotted and the best results are usually obtained from planting in ground that was heavily dressed with organic manure for the previous crop. Where the soil is reasonably well supplied with organic matter carrots respond well to moderate dressings of artificial manure.

It is not possible to give a formula for a manurial dressing that will give optimum results on all soils, but a complete fertiliser highest in phosphoric acid and relatively low in both nitrogen and potash is likely to give good results on a wide range of soils. Such a fertiliser could be made up, for instance, by mixing (by weight) 3 parts of sulphate of ammonia, 8 parts of superphosphate, and 1 part of sulphate or muriate of potash. Alternatively, the dressing given on page 111, though rather high in nitrogen, should give fairly satisfactory results.

On most soils fertiliser dressings should be applied at the rate of about 2 to 3oz. per square yard. Though carrots are fairly tolerant of moderately-acid conditions, any deficiency of lime can be remedied on most soils by the application of 2 to 3oz. of lime per square yard.

To ensure that germination is good the seed-bed should be worked down to a fine tilth. Seed should be sown ½in. deep in rows about 12in. apart. In light soil thinning of most varieties is unnecessary if they have been sown thinly. In heavy soil that tends to compact or where large-rooted varieties are grown plants can be thinned 2 to 4in. apart.

Half-long and long carrots are preferred in most soils for sowing at this time of the year. Good examples of half-long carrots are Chantenay, Nantes, and Danvers. Long-rooted carrots, for example, St. Valery and Intermediate, are grown by many home gardeners. Where the soil is shallow short carrots are often preferred, examples being Guerande, Oxheart, and Early Gem.

Celery

An early sowing of celery can be made now. To grow the plant successfully it is essential that the temperature should be maintained at well above 50 degrees F. Seed should therefore be sown under glass early in the season, though outdoor sowing is satisfactory later in favoured districts or warm situations.

A celery "seed" is very tiny. It is actually a fruit and the embryo within is minute and relatively weak. Consequently germination is usually poor unless conditions are very favourable. Seed should therefore be sown in a fine, moderately-rich. specially-prepared soil and when the seedlings are large enough to handle they should be pricked out about 2¼ to 2½in. each way in the boxes from which they will ultimately be planted in the field. Plenty of ventilation is desirable and the seedlings should be kept near the glass so that they do not become drawn up.

[*Green and Hahn Ltd. photo.*

Carrots are high yielding and not difficult to grow. Though they are not used to the same extent in summer as in winter, they are in fairly constant demand in most gardens in summer. Successional sowings such as these are usually advisable.

Because of the likelihood of damage caused by the leaf spot fungus (*Septoria apii*), which is often seed borne, it is important to start with clean seed. Infection of seed can be greatly reduced, though not entirely eliminated, by steeping infected seed for 3 hours in a solution of 1 part of formalin (40 per cent. strength) to 300 parts of water (1 fl. oz. to 15 pints of water). Another method of treating the seed is to place it in a muslin bag immersed in hot water held at a temperature of exactly 118 degrees F. for half an hour. Afterward the seed should be rinsed with cold water and sown while still wet.

Infected seed is usually less dangerous after 3 or 4 years, as the fungus loses its vitality with age. Seed, however, loses much of its germinating capacity with age and the fungus may still remain alive after 8 years. Where the fungus occurs regularly it is advisable to space the seedlings widely and to spray with Bordeaux from the time of pricking out, even before the disease is seen.

Varieties

Self-blanching celery is most popular in New Zealand, and varieties such as Golden Plume and Golden Self-Blanching are sold by most seedsmen. The non-self-blanching varieties are, however, well worth a trial, because most are superior in quality and flavour to most varieties of self-blanching celery.

Frost-tender Vegetables

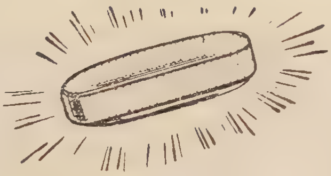
To obtain early crops where there is danger of frost until late October or even November it is a good plan to make sowings of such tender plants as pumpkin, marrow, and cucumber under glass. An electrically-heated hotbed is excellent, though a hotbed of fermenting manure, hops, or other organic material is easily made if fermentable material is available.

The recognised safe dates for planting out frost-tender vegetables vary considerably in different districts, and as about a month is required when conditions are favourable to raise seedlings of most cucurbits to a size where they can be planted out with advantage, time of sowing must be correlated with the facilities available for raising the plants and the date of the last killing frost. It is not advisable to sow too early, as cucurbits do not transplant readily, and difficulty in transplanting and the resultant set-back are greater when the plants are large.

In a few parts of the North Island frost-tender vegetables such as dwarf and climbing beans and cucurbits can be sown out of doors by about mid-September, but in most districts it is necessary to defer sowing until well on in October or even until early November. Even where protection can be given against frost there is nothing to be gained by sowing in cold, wet ground.

Leeks

Leeks are one of the most reliable vegetables for the autumn, winter, and spring. Though they "stand" well in cool, moist conditions, they send up seed heads fairly quickly if subjected to dry, warm conditions, and to ensure a long season of supply it is advisable to make two or three sowings.



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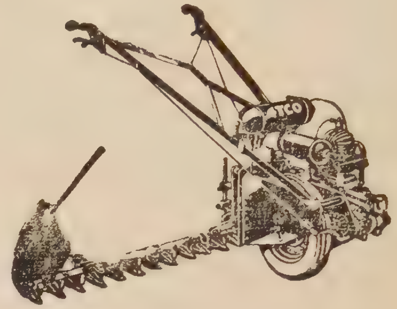

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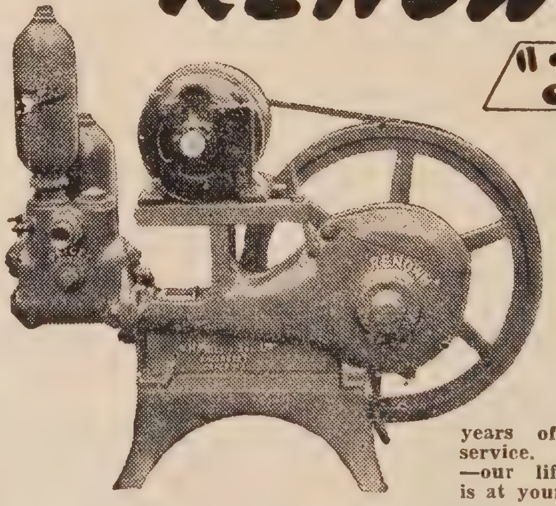

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Because of cool soil conditions the early sowings in most districts should be made in a box of prepared soil under glass. Later, seed can be sown thinly ½in. deep in rows 12in. apart.

The London or Broad Flag is a good variety for sowing now, as it matures a little more quickly than either Musselburgh or Lyon, both of which can, however, be sown if desired.

Potatoes

It is too early yet in most districts to plant main-crop potatoes, though an early planting can be made if the home gardener is prepared to keep the tops earthed up while frosts are heavy enough to cause damage. Tubers should be planted as advised in last month's "Journal." It is not necessary to green and sprout tubers before planting, but earlier crops can usually be obtained by sprouting them.

It is important when planting potatoes to plant Government Certified seed. Few vegetables are subject to as many diseases as the potato, and many diseases do not show in the tubers except to the expert. Tubers infected with virus diseases such as leaf roll, mosaic, and crinkle may appear healthy and of a desirable type, yet if it were not for the system of certification, these diseases would reduce the total yield of potatoes in New Zealand by a half or perhaps two-thirds. Virus diseases are transmitted mainly by aphides (green fly), the lower incidence of which in the South Island is the main reason for the growing of most of the Certified seed there.

Apart from the purchase of Certified seed, the important points in potato growing are choice of variety suited to the district, purpose for which the variety is grown (that is, early, second early, main crop, or late), soil condition, and cultivation. Soil can be maintained in good condition by the addition of humus or humus-forming materials, by the judicious application of fertiliser, by suitable rotation of crops, and by drainage where necessary.

The soil for potatoes should preferably be deeply and thoroughly cultivated, as thorough preparation of the soil not only ensures a perfect seed-bed, but helps to maintain satisfactory moisture, aeration, and temperature. Soils that have been trenched should, however, be given time to settle before planting commences.

Heavy dressings of organic manure are not advisable just before planting, as they may induce a condition which favours scab. A heavy dressing applied the previous year so that it is thoroughly decomposed or a green crop dug in some time before planting will, however, usually give satisfactory results, as also will the addition of such material as grass clippings.

Soils which have been heavily limed or heavily dressed with the ashes of the garden bonfire should not be used; the potato is tolerant of acid conditions, and in soils infected with the potato scab organism the growth of the organism will be suppressed if the soil is medium to strongly acid. (Lime gives the soil an alkaline reaction.)

[*Green and Hahn Ltd. photo.*

Spinach beet or perpetual spinach beet is a form of silver beet which is especially valued for its long-standing qualities and high yield. Where conditions are not too hot or dry it will continue to develop leaves which can be plucked by the housewife for many months.

The fertiliser required for potatoes is greatly dependent on the amount of organic matter previously incorporated in the soil, but in general it has been found in Department of Agriculture trials that a mixture (by weight) of 1 part of sulphate of ammonia and, according to soil type, 3 to 5 parts of superphosphate applied at about 1½ to 2oz. per yard of row will give good results. The addition of muriate of potash or preferably sulphate of potash at the rate of about 1/3oz. to a yard of row will give improved results on many soils and is advised for most home garden soils. As an alternative to the superphosphate and sulphate of ammonia equal parts of superphosphate and blood and bone can be used.

The simplest way to plant is usually to open a trench about 4in. deep and to dust the fertiliser along it. In the home garden rows are usually 2ft. apart and tubers can be placed from 9 to 14 or 16in. apart in the rows. The wider spacings are favoured for main-crop or very large growing varieties. If the tubers are large, that is, 4oz. or more, they can be cut into two or more sets if desired. Each should be chunky or cubical and have at least two eyes and a minimum of cut surface.

The important point about planting cut tubers is to ensure that the cut surfaces do not dry out, but heal or callus over promptly. That can be done by planting them immediately they are cut in a soil that is neither too wet nor too dry, or after cutting them leaving the cut surfaces in contact, though they should be broken apart from time to time. Alternatively, they can be kept at a temperature of 60 to 70 degrees F. and a very high humidity for about 7 to 10 days. Temperature and humidity should, however, be lowered as soon as healing is complete to prevent sprouting. Hygiene is also very important in handling cut tubers, as the tubers are liable to the attack of soft-rotting organisms until the cut surfaces heal.

Though the most generally planted potatoes for early crops are Epicure and Arran Banner, there are numerous other good varieties listed in most good seedsmen's catalogues that are suited to different districts.

Radish

Small successional sowings of radish should be made as required. Cultural requirements are in general similar to those of beetroot and carrots, but as most varieties mature much more quickly, they are much more sensitive to adverse soil conditions. The soil should be well drained and preferably light, the top 6in. being cultivated to a very fine tilth. It should be very rich in fine, well-rotted organic matter; well-matured compost is excellent, though improved results are usually obtained if in addition a complete fertiliser is applied at the rate of about 1 to 2oz. per square yard.

Radish usually succeeds best in a soil that is slightly to moderately acid. Lime is therefore unnecessary on many soils that have been limed for a previous crop, though a light dressing applied preferably some time before sowing is likely to be beneficial on soils in high-rainfall areas. The soil should be gently firmed after cultivation, as the roots do not "bulb" well in loose soil. The soil should never dry out and in midsummer shelter from the sun is advisable;

this is best achieved by sowing summer crops in the shade of a taller crop.

Seed can be sown at any time of the year in well-drained soil, provided there is sufficient moisture and ground temperature is not below about 52 degrees F. The seed should be sown thinly (at the rate of about 12 to 15 to 1ft.) ½in. deep in rows that need be only about 6 to 8in. apart for any except the Chinese varieties. Seed can also be broadcast, though weeding is then more difficult and the beds must not be too wide or harvesting may be difficult without treading on the bed.

Varieties of radish can be grouped as oval, turnip shaped, long, and giant or Chinese. Any of the smaller or medium-type radish such as French Breakfast, White Icicle, Long Scarlet, or Chartier is suitable for sowing now.

Rhubarb

If it is intended to plant a new bed of rhubarb, the work should be done without delay. Pieces of crown, each with one or two buds, should be chosen, and after any long whippy pieces of root have been trimmed off the pieces of crown should be planted (with the tops covered by about 1in. of soil) 24 to 30in. apart in the rows, with the rows 30 to 36in. apart according to the vigour and habit of growth of the variety.

It is difficult to apply too much organic manure to established rhubarb during the growing season and the ground on which a new bed is to be established should be liberally dressed with organic matter such as compost or stable, farmyard, or poultry manure, preferably some time before planting. In moist, well-drained soils adequately supplied with organic matter rhubarb responds well to artificial fertilisers. The complete fertiliser advised on page 111 will give good results. It can be applied at 3 to 7oz. per square yard, but if the heavier dressings are given, it is very important to incorporate them thoroughly throughout the root area.

Established rhubarb plants are easily forced by covering the crowns with a box or pile of straw to retain heat and as a protection against frost, which though unlikely to damage the leaves which develop under normal conditions, will quickly bring about the destruction of exposed leaves which have been forced into early growth by artificial means. Early varieties should be chosen for forcing. Forced rhubarb has less development of the leaf blade and the stalks are more tender and sweet than rhubarb grown under ordinary conditions.

Silver Beet, Spinach Beet, and Spinach

Leaf beets and spinach are health-giving vegetables that are worthy of a place in practically every home garden. Silver beet or Swiss chard differs from spinach beet in its upright habit of growth and large leaves, which have broad, white or whitish midribs. Spinach beet is sometimes called perpetual spinach (beet) and is a form of silver beet with smaller leaves which arise from a basal crown. It is one of the most useful of the leaf beets, because unless conditions are hot and very dry, it will continue to develop leaves which can be plucked as required by the housewife for many months.

Spinach is less enduring under hot summer conditions, but is quicker maturing, as in the moist relatively-cool conditions of spring varieties of it will mature in good soil conditions in from 40 to 55 days. The soil for all the above vegetables should be moist, fertile, well cultivated, and well drained. Lime at the rate of 2 to 3oz. per square yard should be applied to soils not recently dressed and a good dressing of organic material such as well-rotted farmyard or stable manure is advisable on many home garden soils. In addition, the fertiliser mixture recommended on page 111 will give good results if applied at the rate of from 2 to 3oz. per square yard.

[Green and Hahn Ltd. photo.

Woodlice (about three times natural size.)

Seed should be sown ½in. deep in rows 12in. apart for spinach and spinach beet and 15 to 18in. apart for the upright-growing leaf beets. Any of the varieties of leaf beet can be sown now, but it is advisable to choose where possible a variety of spinach which is fairly tolerant of warm conditions.

Turnips, Beetroot, and Parsnips

Culture and soil conditions for turnips, beetroot, and parsnips are in general similar to those recommended for carrots. Except where there is a special demand for them, there is no need to sow parsnips yet, because in most southern districts October sowings are satisfactory for the main crop and in central and northern districts November or December is favoured. Adequate supplies for a long period can usually be obtained from one sowing, and as parsnips are mainly regarded as a winter vegetable, successional sowings are rarely necessary, particularly as too-early sowings of main-crop varieties often produce roots that are rather woody. Where an early crop is desired, however, a sowing can now be made, preferably of the stump-rooted or oxheart varieties, which mature a little earlier than varieties such as Student or Hollow Crown which are favoured for the main crop.

Good quick-maturing varieties of beetroot and turnip that can be sown now are:—

Beetroot: Flat Egyptian, Early Wonder, and Detroit Dark Red.

Turnip: Early Milan, Early White Stone, and Snowball.

Seed of turnip, parsnip, and beetroot should not be sown too deeply at this time of the year, when the ground is still rather cold. In most soils parsnips can be sown ½ to ¾in. deep and beetroot and turnips 1/3 to ½in. The seed-bed should be deeply dug and finely cultivated. It should be gently firmed with a board or by shuffling lightly across it before sowing.

Woodlice

Woodlice ("slaters," "sowbugs," or "pill bugs") are mainly troublesome to very small seedlings, particularly in boxes or under glass, as they eat the tender growth. They are greyish with an oval, arched back divided into numerous segments. Some species curl up into a round ball if disturbed. They are mainly scavengers, but occasionally are carnivorous.

They can be controlled by clean cultivation and the removal of rubbish which provides breeding grounds. Boiling water can be poured on them if there are only isolated groups. D.D.T. is effective under glass where the powder can be dusted on benches or shelves. Sliced potatoes dipped in arsenate of lead are also effective and a poison bait, which is also useful for cutworms, grasshoppers, and grass caterpillars (porina), can be made by mixing 1½lb. of bran with 1oz. of paris green, ¼ pint of treacle, and 1½ pints of water. The treacle should first be dissolved in water. The bait should be broadcast in the evening over the infested ground. It is likely to be too much for dealing with slaters alone, as it should be sufficient for about 200 sq. yds.; it should be used without delay, as it tends to become mouldy.

◆

Pig Broadcasts

UNDER the auspices of District Pig Councils broadcasts will be delivered in September as follows:—

Rotorua—1YZ, on September 27, at 12.35 p.m., "Pig Production in the Bay of Plenty," by A. F. Barwell, Supervisor, Bay of Plenty District Pig Council.

Wellington—2YA, on September 15, at 12.35 p.m., "The Baconer and Porker Carcasses Required for the Local Market," by C. M. Bailey, Supervisor, Taranaki District Pig Council.

◆

CALDER : A New and Distinct Variety of Swede

By J. H. CLARIDGE, Agronomist,
Department of Agriculture, Wellington.

IN the past the varieties of swedes grown in New Zealand have all been of European origin. Before the war imported seeds came out under a wide range of descriptive names. Some of these referred to distinct varieties, some merely to reselections within a variety. With the development of swede-seed production locally, it has been possible to simplify very appreciably the list of names and at the same time to obtain fairly clear-cut distinctions between the varieties of seed being sown.

THERE is now available a new and distinct variety raised in this country from a breeding programme laid down 14 years ago by the Agronomy Division of the Department of Scientific and Industrial Research. This swede, supplies of Government-approved seed of which are available for distribution this year, is being named Calder after the late Mr. R. A. Calder, who was responsible for the breeding, selection, and testing of this new variety almost until its release into commerce.

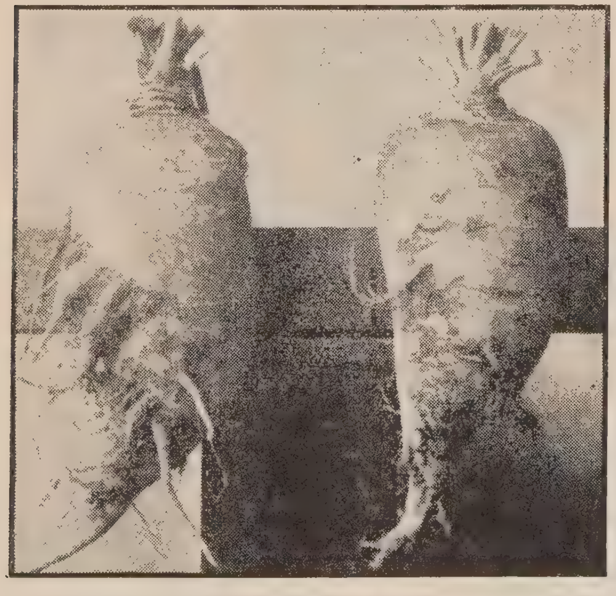
A good crop of the new Calder variety of swede.

Selected from Double Hybrid

The hybrid from which this variety was selected was a double hybrid; one parent was a first-generation hybrid between Tipperary and Grandmaster, the other a similar hybrid between Tipperary and Sensation (or Vilmorin). Tipperary itself is of the Grandmaster type of swede, so that virtually the parentage of the Calder swede is three-quarters Grandmaster type and a quarter Sensation.

Grandmaster, one of the major swede varieties in this country, is a purple-topped, yellow-fleshed variety grown widely on the medium to rich, heavy land of the main swede-growing areas. It shows no particular resistance to any of the common diseases attacking swedes.

Sensation is a purple-topped, white-fleshed variety the growing of which has been confined to the drier areas. It has a long taproot which is inclined to grow fangy, but which is of advantage and enables it to out-yield other varieties in times of drought. It is particularly resistant to attacks by aphides and to infection by turnip mosaic.



Comparison of Sensation (left) and Calder bulbs.

Alternative to Sensation

The new variety was developed primarily as an alternative to Sensation. It is bronze topped, but has a yellow flesh and a bulb more resembling that of Grandmaster. Its root development is stronger, but is not as pronounced or fangy as that of Sensation.

It has inherited from the Sensation parent a similar degree of resistance to aphis attack and to turnip mosaic. Turnip mosaic is prevalent in the drier districts and is transmitted from plant to plant by aphides, so that this resistance is of great value to a swede for drier areas. Preliminary trials indicated the potentiality of this variety under drier climatic conditions, and it became known provisionally as Calder's Dryland.

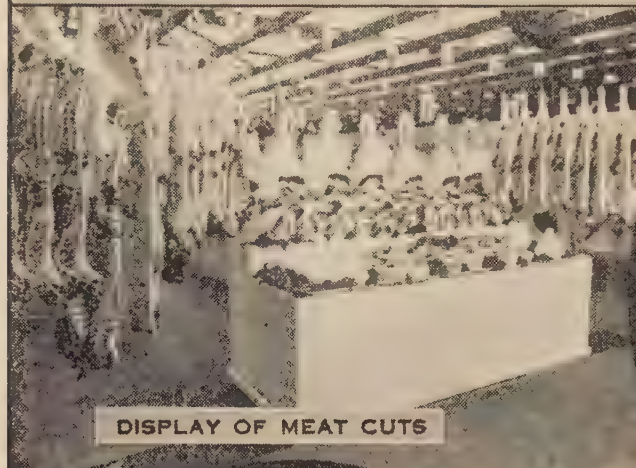
In more extensive trials since carried out throughout New Zealand the variety has compared favourably with other varieties in the swede-growing areas of North Otago, Canterbury, Wairarapa, and Hawke's Bay. It was felt, however, that the term Dryland might carry a wrong impression of the capability of this variety, and it has now been named simply Calder after its breeder.

The trial results indicate that the Calder swede may be expected to give good results under reasonable soil conditions in the areas mentioned above and in other areas having a similar climate. Its resistance to aphis attack and to infection with turnip mosaic and its strong rooting system enable it to thrive where other yellow-fleshed varieties fail and where its only competitor is the white-fleshed Sensation.

Results from trials in wetter districts have not been so promising. The report on one trial recorded a degree of resistance to both club root and dry rot, though this has not been confirmed so far in other trials elsewhere.

Government-approved seed of Calder swede is available commercially for the first time this year, and supplies will be distributed through the usual mercantile firms in time for growing in the coming season.

SCENES AT THE FREEZING WORKS

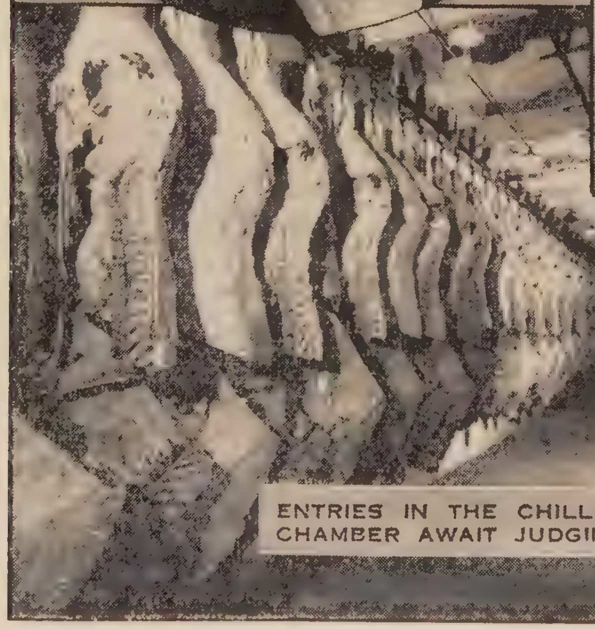


DISPLAY OF MEAT CUTS

MR. F. MERRITT (MEAT PRODUCERS' BOARD) PRONOUNCES JUDGMENT ON A BEEF CARCASS

FIRST PRIZE CHILLING HEIFER

WESTFIELD FREEZING COMPANY REPRESENTATIVES INSPECT ENTRIES



ENTRIES IN THE CHILLER CHAMBER AWAIT JUDGING

SECONDARY PRODUCTS

[Sparrow Industrial Pictures Ltd. photos.

Fine Display of Beef Cattle at Waikato Championship

ENTRIES from as far afield as Whangarei and Dannevirke contributed to a record total at the Waikato Winter Show Association's second post-war beef championship. The judges on the hoof at the Frankton saleyards agreed that the display was the best ever seen in the Waikato, and the judges on the hooks at the Westfield freezing works described the entries as the best they had ever been called on to judge.

THE six classes drew 352 entries this year, compared with 234 last year. It was by far the largest display seen in the Waikato, and probably the largest yet assembled in New Zealand. The total value of the cattle on show was estimated at £6000. Aberdeen Angus and Aberdeen Angus-Hereford crosses predominated, practically all the prizes going to beasts of the Aberdeen Angus type.

No "Tail-end" to Entries

The judges of the stock on the hoof were Messrs. T. Marks and J. C. Binsted (Auckland) and D. F. Hare (Gisborne). Mr. Marks, one of the Dominion's most noted judges of beef, said that judging such classes was becoming increasingly difficult because the larger number of beef shows had educated producers to recognise what was required. Ten years ago selecting the best entries was comparatively easy, but with the present uniformity of quality the task was entirely different. This year's championship had certainly indicated that farmers were learning from these displays, for the entries showed practically no "tail-end."

The three judges agreed that farmers showed more appreciation of the type of beast that would be required for the chilled beef trade, but expressed the opinion that some producers still tended to do their cattle a little too well.

Importance of Strain

The judges were unanimous that the carcasses of the entries after they had been killed at Westfield constituted the finest display of beef they had ever judged. They made particular reference to the quality and evenness of the heavy chiller class, and said the light chiller heifers, though a small class, included some of the finest beef carcasses that could be wished for.

One of the judges, Mr. F. Merritt, suggested that farmers should pay attention to the strains within their breeds which gave the best type of carcass. By breeding they could achieve the right type of animal, and feeding would provide the desirable finish, he said.

[*J. F. Lowden photo.*

The final judging on the hoof at Frankton saleyards.

Results of Judging

The championship trophy for the best chiller steer on the hooks was won by J. E. Richardson, of Te Akau. Other results are:—

On the Hooks

Steer suitable for chilling, 500 to 600lb.: L. Seifert (Tuhikaramea), 73 points, 1; J. R. Kay (Te Awamutu), 72, 2; E. Rumney (Taupiri), 71, 3.

Steer suitable for chilling, 601 to 720lb.: J. E. Richardson (Te Akau), 79 points, 1; Department of Maori Affairs (Hangatiki block), 78, 2; H. and S. Rhodes (Ohaupo), 76, 3.

Bullock suitable for freezing, 721 to 840lb.: H. C. Wells (Hinuera), 80 points, 1; Mrs. E. C. M. Finlayson (Tuhikaramea), 79, 2; G. Bull (Ngaruawahia), 76, 3.

Heifer suitable for chilling, 550lb. and under: W. J. Griffen and Son (Te Puke), 82 points, 1; C. D. Bryant (Tauwhare), 76, 2; J. O'Shea (Whangarei), 75, 3.

Heifer suitable for chilling, 551 to 650lb.: J. N. Stewart (Morrinsville), 79 points, 1; G. Furniss (Huntly), 78, 2; Mrs. E. C. M. Finlayson (Tuhikaramea), 76, 3.

Fat cow: T. M. Glen (Ohaupo), 72 points, 1; W. J. Griffen and Son (Te Puke), 67, 2; G. Bull (Ngaruawahia), 66, 3.

On the Hoof

Steer suitable for chilling, 500 to 600lb.: L. Seifert 1, J. R. Kay 2, Mrs. E. C. M. Finlayson 3.

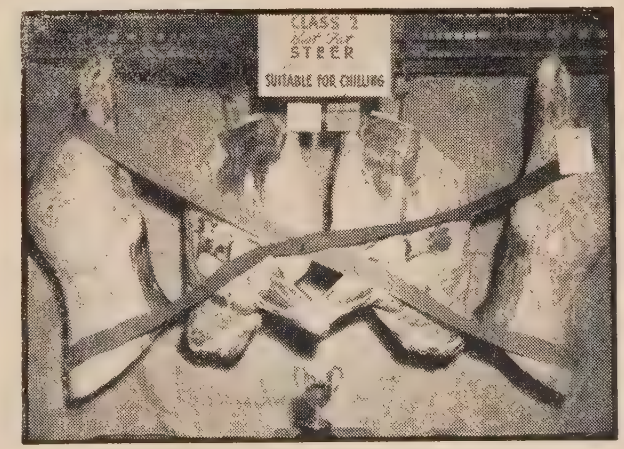
Steer suitable for chilling, 601 to 720lb.: J. R. Kay 1 and 2, H. Chapman 3.

Bullock suitable for freezing, 721 to 840lb.: H. C. Wells 1, H. and S. Rhodes 2, D. Finlayson 3.

Heifer suitable for chilling, 550lb. and under: Mrs. E. C. M. Finlayson 1, G. O. Bayley 2, R. K. Reynolds 3.

Heifer suitable for chilling, 551 to 650lb.: R. K. Reynolds 1, Gee and Son 2, W. E. Clark 3.

Fat cow: Mrs. E. C. M. Finlayson 1, J. R. Kay 2, I. Brockett 3.



[*Sparrow Industrial Pictures Ltd. photo.*

The grand champion carcass, entered by Mr. J. E. Richardson, Te Akau.

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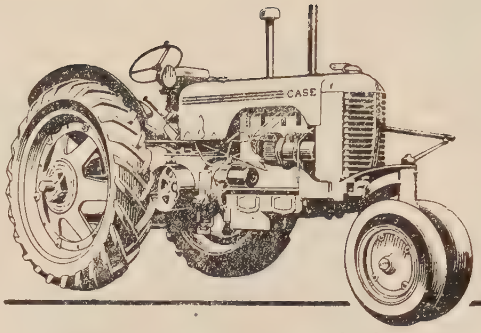

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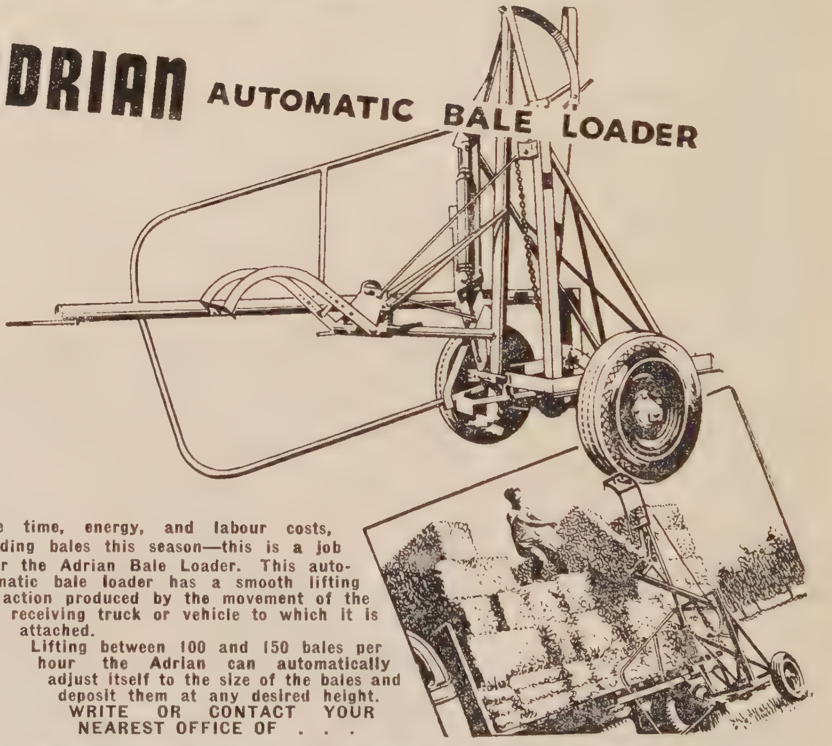

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ROYAL COMMISSION ON SHEEP INDUSTRY

THE Royal Commission on the Sheep Industry was appointed in August, 1947, and after hearing evidence throughout the country presented its report to the Governor-General on March 31 of this year. Its report has now been printed and released for general circulation and details of how a copy may be obtained are advertised on this page. The report is of considerable length and is an integrated unit from which it is difficult to select excerpts. The Commission has set down not only its recommendations and the reasons for proposing them, but also the alternatives considered and the reasons for their rejection. All sheep farmers should make themselves thoroughly familiar with the report. The following is a summary by L. W. Woods, Economist-Secretary to the Commission, of the principal recommendations of the Commission.

THE Commission has grouped its recommendations under 5 headings as follows: 1. Administration; 2. Land tenure; 3. Condition of the land; 4. Farming difficulties; 5. Labour and community facilities.

1. Administration

After reviewing and praising the organisation of the dairy industry the Commission has said that a similar structure is required for the sheep industry. To achieve this it is recommended that the New Zealand Wool Board be abolished and replaced with a Sheep Industry Board whose powers and duties will be similar to those of the New Zealand Dairy Board. It proposes that the country be divided into 8 wards, each containing approximately 4 million sheep. The Commission has set out these proposed wards in maps, being careful not to cut across the provincial and branch affiliations of farming organisations. It is proposed that from each of these wards one member of the Sheep Industry Board should be elected, one ward member to be the chairman of the board. Other members of the proposed board are to be the chairman of the New Zealand Meat Producers' Board, a representative of the Government, and another representative appointed by the Government who should have special knowledge of farm working conditions. The suggested system of election and other matters are set out in the report. Parallel to the proposed Sheep Industry Board a Sheep Division should be established in the Department of Agriculture similar to the Dairy Division for the dairy industry.

The principal problem before the Commission, and the one most widely discussed, was that of marginal lands. The proposals for marginal lands put forward by the Commission are nothing less than a gigantic national development programme aimed step by step, each of which is set out in detail by the Commission, to raise production from an exportable surplus of £80 millions today to one of £150 millions, at present parity, in 50 years' time.

It recommends that farmers on marginal land make application for assistance if they require it and that a plan be drawn up to put the farms of such applicants in a satisfactory state of permanent production. The money is to be advanced by a proposed Marginal Lands Board to be set up to direct the plan through the Department of Lands and Survey. The farmer is not to be asked for repayment of advances until the production of the land is increased, and the amount repaid is not to exceed the increased value of the farm as a result of the extra production. Full details of the proposals are set out in the report, which suggests that the actual work of the Board be carried out by a Marginal Lands Division of the Department of Lands and Survey.

Copies of the Report of the
ROYAL COMMISSION ON THE
SHEEP INDUSTRY
are obtainable
at 3s. 9d. each
from
Offices of the Department of Agriculture
at
AUCKLAND, PALMERSTON NORTH,
CHRISTCHURCH, and DUNEDIN,
or from 22 Customhouse Quay, Wellington.

A considerable section of the report deals with erosion. The Commission has praised the work done on river control and criticised that done on soil conservation. It has recommended that the Soil Conservation and Rivers Control Council should remain as a Rivers Control Council. Catchment boards should be abolished, as they have "no essential functions to fulfil." Much of what has been published about soil erosion the Commission has termed "misleading propaganda."

2. Land Tenure

Recommendations are put forward concerning Crown leases and for the regrouping of uneconomic runs, for burning, compensation, and development, abandoned lands, Maori lands, and badly-farmed lands. The policy recommended for land tenure is one of rewarding good husbandry and penalising bad.

3. Condition of the Land

The recommendations are divided into three parts: Deterioration, depletion, and erosion.

The Commission says that the answer to deterioration is to raise the fertility again. The introduction of a standard price for superphosphate is recommended—that is, that it should be the same price on the farm irrespective of location. The areas of land requiring fertiliser are set out, together with the amounts of fertiliser which will be required through the years. The composting of all municipal wastes is recommended on the Dannevirke pattern to augment the limited supplies of manure available. Farmers are recommended to use more cattle and fewer sheep to improve their pastures. The Commission is of the opinion that the only answer to depletion is to get rid of the rabbits, which are its principal cause. "We say that rabbits must be exterminated, gigantic though the task may be," reads the report. "Reduction and control are not sufficient. . . . Extermination is the only safe answer to this national menace." The Rabbit Destruction Council should "have the support of every farmer." Finally the Commission says: "Ten or twenty million pounds would be a small price to pay for the extermination of rabbits." After the depleted land has been cleared of rabbits it will require a pasture plant or plants which will stand up to grazing under low-rainfall conditions. Steps in this direction are recommended.

Of erosion the Commission says: "The erosion which has occurred has been due more to the effects of deterioration and depletion than to any naturally-erosive characteristics of farming in New Zealand."

4. Farming Difficulties

Among the farming difficulties on which recommendations are made are pests, weeds, access roads, and snow losses. Considerable attention is given to noxious weeds. "We are gravely concerned at what we have seen on the tour," the Commission reports. "It might be considered the shameful effect of 100 years' occupation that so many weeds should appear on the landscape." Strong measures are recommended. An all-weather access road to every farm is recommended as a roading policy.

5. Labour and Community Facilities

Availability of labour, housing, and community centres is included in the recommendations. Special consideration of back-country conditions is urged. "We consider it is not the wish of the people of New Zealand that men and women should work under such hard conditions," the report states. "Our country needs the production from the back country. Let not the brilliance of the sheep industry's progress and prosperity on first-class land dim our vision of the hardship in remote areas. Let us set our hearts to the task. . . . Let us send to them the comforts of a modern life—education, electricity, access to doctor and nurse, those important things which mean more than a world to the mother of a family in the back country."

Local Problems

Many local problems were brought before the Commission and the answers to them vary from straight requests for action on an obvious grievance to statements of the principles on which a settlement should be effected in other cases. In some cases, after full investigation, the reply is: "We have no recommendation to make."

The general trend of the Commission's findings is perhaps best evident in the opening paragraphs of its report.

"New Zealand is a farming country. It is from the proceeds of selling overseas the produce of our farms that we have obtained the money to buy steel to lay our railways, to buy machinery to make our roads, to acquire cars, lorries, buses, carriages, and wagons to provide transport. It is with the proceeds of our farm produce that we have bought merchandise to stock our many shops. It is to load that produce that overseas ships come to our ports, providing work in many trades. . . . It is veritably from her farms that New Zealand lives. . . . The condition in which we are to leave our land today has an all-important bearing on our national welfare tomorrow. High levels of farm production do not necessarily mean good maintenance of the land. In reaping the rewards of farming production we must be careful to put enough back into the land to maintain and improve our asset."

Price of Superphosphate Reduced

A REDUCTION in the price of superphosphate as from July 1 was announced by the Minister of Agriculture, Mr. E. L. Cullen, recently. The new superphosphate price would be reflected in lower prices for the various fertilisers in which superphosphate was used as a base, said Mr. Cullen. The new price in every case would apply to all orders dispatched from works on and after July 1, 1949.

The price of superphosphate in jute bags would be £7 10s. 6d. per ton ex works North Island and £7 11s. 6d. ex works South Island. The previous practice of charging at free delivery points in the South Island ceased as from July 1, 1949.

Farmers should note that supplies of paper bags for fertilisers are almost exhausted. Fertilisers supplied in this type of container will, of course, be charged at 12s. per ton below the price for fertiliser supplied in jute sacks.

[*Ministry of Works photo.*

LOSSES IN LAMBS AFTER PROLONGED WET WEATHER

THE need for careful watching of lambs after any prolonged spell of wet weather to avoid losses through cases of mycotic dermatitis, a fungus disease, is stressed in this article by D. H. LeSouef, Veterinarian, Department of Agriculture, Wellington.

TWO cases of mycotic dermatitis occurred last year in Marlborough after some days of heavy rain. One case occurred during September in a flock of about 200 ewes with lambs 2 to 4 weeks old. There had been heavy rain a week or so before the visit of the writer and the lambs had been standing in water or were very wet for up to 48 hours. Well over 50 per cent. of the lambs were very lame in the joints of either fore or hind limbs or both, with heat and pain, but little swelling. Some had elastic bands on the purse and tail, but there was no difference between the numbers of lame lambs in the group so treated and the untreated group; furthermore, males and females were similarly affected. Other flocks of about the same size and ages on hill country were not affected.

Recovery took place on removal of the stock from the wet paddock to new pasture during the fine, warm days which followed. The lameness gradually disappeared as the lambs exercised themselves and permanent arthritis did not result.

Matting of Wool

The other case occurred in August in another part of the same district after the same wet spell, when lambs, though not standing in water, had been continually wet for some days. In a flock of 100 ewes with lambs varying in age from 1 to 4 weeks 4 lambs had died and 2 were very weak when seen by the writer. The skin and wool of the worst cases had matted and set into one piece like a board on either side of the lamb, with the hardness in some cases extending to the limbs and neck. Others had only irregular patches affected throughout the area of the skin.

Use of Copper Sulphate

The wool was treated with a weak solution of copper sulphate and the worst cases were drenched with epsom salt. The matted wool could not be softened satisfactorily, cleaned with warm water, soap, or soda, or clipped off.

About 9 lambs were lost in all, but those which recovered had suffered a bad setback. The ewes were wintered on a ryegrass and white clover pasture and lambed on an improved ryegrass and red clover pasture.

In view of the possibility of prolonged wet weather again this spring, symptoms of this disease should be watched for carefully. Where inflammation of the skin with matting of the wool takes place the affected area should be soaked well all round with a weak solution of bluestone.

The Management of Poultry Breeding Stock

THE principles of poultry breeding were described by F. C. Bobby, Superintendent of the Poultry Industry, Department of Agriculture, Wellington, in articles in the April, May, and June issues of the "Journal." This article continues the series and begins a review of poultry-breeding practice. The previous articles dealt largely with the theory of breeding; in this one the management of breeding birds receives detailed consideration.

A single-pen mating of White Leghorns.

THOUGH the first practical operation to be described is the method of mating stock, it is a prerequisite that the birds be in the correct condition for breeding. This has an appreciable effect on results, though it is not strictly an aspect of breeding practice.

Breeding hens should arrive in their pens in lean, hard condition. Fatness often results in poor-shelled and misshapen eggs with lowered hatchability. Contrary to the opinion often expressed, many pullets of good constitution end the moulting season in splendid condition, and unless care is taken, such birds may reach the breeding season carrying a surplus of fat. In a hen retained for a second breeding season this danger is far greater.

Where possible, potential breeders should be given free range conditions during the moulting period. In addition, these birds may be restricted to grain feeding on a reduced ration; how restricted the feeding should be depends on the condition of the birds at the time. Treated in this manner the birds, when completely through the moult, will be devoid of surplus fat round the pelvic bones and will handle on the light side. Once in the breeding pen the birds should receive mash in addition to grain, when they will recover any loss of condition rapidly, but without accumulating fat. Unrestricted feeding of dry mash with grain during and after the moult too often retains birds in a fat condition, leading to a wastage of hatching eggs and poor hatchability.

Methods of Mating Birds

There are three methods of mating poultry, two well known and a third used comparatively rarely and only by specialist breeders.

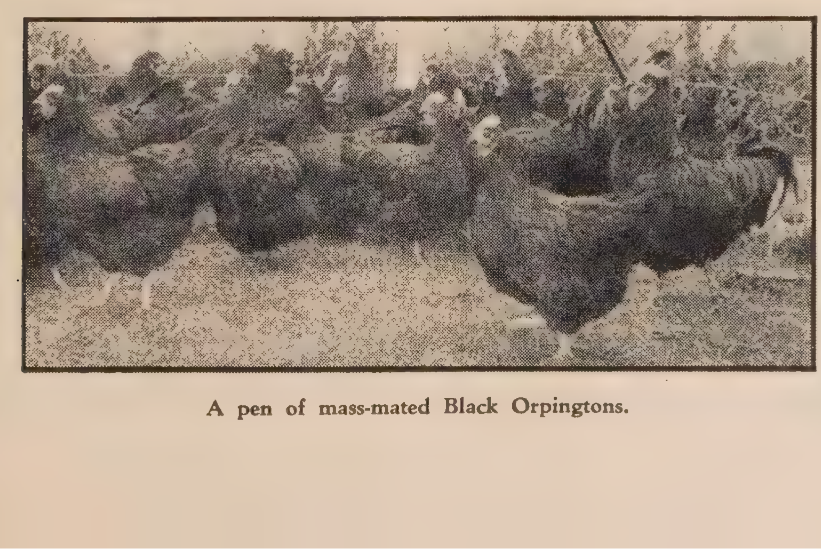
Mass Mating

The mating of a number of males to a flock of breeding hens is a method common with commercial poultry breeders. The system permits of no pedigree breeding work, as the male parent of the chicks hatched is unknown. That also applies to the female parentage unless the hens are trap nested and the hatching eggs marked, which is almost unknown where mass matings are adopted.

If stock and management are both satisfactory, mass mating gives excellent fertility and a good class of chick. With light breeds 6 good cockerels to 100 hens give satisfactory results, but usually it is wise to include 7 males to provide against the loss of 1 or even 2 of the team because of fighting or bullying. It is rarely possible to add a cockerel to a team of birds after they have been mated if one of the original birds dies or has to be removed; the addition of a new male, even if slipped in at night while the birds are perching, often results in fighting and loss of fertility. With heavy breeds a minimum of 8 males to 100 hens is desirable.

Obviously, if the minimum number of males of either light or heavy breeds is used, it is desirable to have a spare team of males in reserve. However, if a margin of safety is ensured as a protection against losses in a team, by the inclusion of more than the minimum, reserve teams become unnecessary.

In a mass-mated pen run intensively (that is, in a house with no outside run) a higher proportion of fertility is obtained if the house or pen is divided by solid partitions extending part of the way across the floor. Unless this is done, the males are in full view of each other and will disturb each other during the operation of mating. There is less likelihood of this occurring in a large house or where the male birds can get away from each other.


A pen of mass-mated Black Orpingtons.

Pen Mating

When a limited number of females is mated with one male the male parentage is known and the chicks are all half sisters or half brothers with a common male parent. By trap nesting it is possible to trace the female parent, and consequently pen matings are usually used where pedigree work is undertaken. On an average a heavy-breed cockerel will take 10 to 12 females and a light-breed male 15 to 20 females. If cock birds are used, these numbers should be reduced to 8 and 12 females.

As the male bird sires every chick in a pen mating, the male must be selected with the utmost care.

Good stock birds, whether pen mated or mass mated, are gallant by nature. At feeding time a good male often spends the greater part of his time calling his hens to feed and does not feed himself. This gallantry, carried on day after day, results in a dangerous loss of body condition and stamina. Many careful breeders avoid this trouble by feeding the males away from the hens. In pen matings that is comparatively easy; the hens can be fed in the house and the side outside, there being only one bird to put out into the run. With mass mating this

A mass-mated pen of White Leghorn males and Black Orpington females.

is more difficult, but with patience the team of cockerels can be trained to go out of the house at feeding time. A retention of vigour throughout the breeding season and the consequent effect on fertility and hatchability amply repay the trouble and time spent in training the males when they are first mated up.

Individual or Stud Mating

In individual or stud mating a male bird is kept in a pen and individual females are mated with him. This system is suitable only for trap-nested stock, each bird being mated after removal from the trap nest. This method enables greater use to be made of a male and does away with the necessity for separate small breeding pens and houses, but it involves considerable labour.

Dubbing of Males

By "dubbing" is meant the removal of the comb and wattles of a male bird. In a cold climate where heavy frosts are experienced dubbing is almost a necessity, as cockerels' combs often become frostbitten. Male birds with heavy combs also may suffer as the result of fighting or be worried by the weight and inconvenience of such a comb, and then lessened activity and lower fertility in the hatching eggs are to be expected.

Apart from those aspects many breeders claim that dubbed males are more vigorous than undubbed birds.

Mating and Fertility

Though fertile eggs may be obtained a day or two after mating laying hens, in practice it is desirable to mate birds at least a week to 10 days before it is desired to save the eggs for hatching. Longer should be allowed if cock birds and not cockerels are used. Reasonable fertility may be expected in hatching eggs after 5 days if the cockerel is active, but fertility does not usually reach its maximum until 7 to 10 days have passed.

Equally important at times is to know when fertile eggs stop being produced after hens have been mated. When a male dies or has to be removed it is desirable to know for certain when the fertility from the first male ceases if the hens are remated. Reasonable fertility may be expected for 10 to 14 days after a male is removed. If the pen is remated, all eggs laid after a lapse of 3 weeks may be regarded as having been fertilised by the second male.

Age of Breeding Birds

A vast majority of New Zealand poultry breeders use cockerels for mating to females. The use of cock birds (males in their second breeding season) is largely restricted to poultry breeders interested in progeny testing or carrying out a definite programme of breeding. Cockerels are favoured for mating because they will carry a greater number of females and because it is considered that in general they give greater fertility. Though this practice can be claimed to be satisfactory, the worth of cockerels as breeding units is entirely unknown when they are mated up except for their general appearance and external characteristics. Further reference will be made to this fact when progeny testing is described.

The age at which a female bird may be used satisfactorily for breeding is a highly-controversial subject. The controversy resolves itself largely into the question of whether breeding from pullets is satisfactory, but the issue is further complicated by the question of defining a pullet. In ordinary circumstances, when birds are hatched during the usual breeding season in spring, a female bird is a pullet during her first laying season and up to the time of her first annual moult; thereafter this bird is a hen.

A mass-mated pen of Black Orpington males and White Leghorn females.

The policy of the Department of Agriculture is to advocate the use of hens for breeding and to condemn breeding from pullets unless it is carried out by an experienced breeder who has detailed knowledge of his stock and wishes to use pullets as an integral part of a breeding programme. Indiscriminate breeding from pullets for the production of hatching eggs, day-old chicks, or perching pullets for sale cannot be condemned too severely. The reasons for this policy are:—

1. The breeding quality of a pullet is unknown because there is

Only limited information about her production capabilities (presuming that the bird is mated in July).

Little or no indication of her susceptibility or resistance to diseases, particularly leucosis and including fowl paralysis.

No indication of her stamina or constitution. She has not been in production long enough by July to indicate whether she has the constitution to stand up to prolonged and heavy production. Many pullets used as breeders have broken down later in the season or during the moult; they gave no indication at the time of mating that they would break down in constitution later.

Information about these characteristics is of great importance when selecting breeding females.

2. There are considerable difficulties in the way of judging maturity in pullets, and breeding from immature stock must be accepted as undesirable.

3. It is generally accepted that breeding from pullets which were bred from pullets is undesirable. If pullets bred from pullets are sold, such birds may be used for breeding, the buyer being unaware that they were bred from pullets.

In brief, there are too many additional pitfalls or dangers in breeding from pullets as opposed to breeding from hens for this practice to be recommended for general use. Breeding from pullets by the inexperienced poultry breeder can be and often is a menace to the producer and to all those who buy stock from him. The spread of leucosis (big liver disease and fowl paralysis) is unquestionably being assisted by indiscriminate breeding from pullets.

FEEDING AND REARING DAIRY CALVES

GOOD feeding in early life provides the foundation of size and constitution in livestock, and without these even the most selectively bred dairy cows will be comparative failures as producers. In any programme of herd improvement the aim should be to rear all heifer calves from cows which exceed the herd average in production, and the feeding and rearing of these heifers should receive attention equal to that given to the milking herd. Inefficient methods of rearing will seriously impair their productive capacity and nullify any progress made through judicious breeding. Methods which will avoid that are described in this article by P. J. McCann, Veterinarian, Department of Agriculture, Hamilton.

THIS subject begins with the feeding of the pregnant cow, particularly during the last 3 months of gestation. A cow which has been kept on a very low plane of nutrition during the winter may produce a calf normal in size and weight at the expense of her own physical condition, but probably the calf will be deficient in essential minerals, such as calcium and phosphorus, while the dam's milk will be low in vitamin A content and consequently the calf will be less resistant to scours and pneumonia. Thus underfeeding of the cow during pregnancy may result in unsatisfactory progress of the calf after birth.

However, it is not advocated that cows should be so highly fed during the latter part of pregnancy that they are in fat condition at calving, particularly if they have to go short of feed during early lactation, as such a practice may result in other troubles unassociated with calf rearing.

Handling a Newly-born Calf

A calf is best left on its mother for its first 24 hours, but if the calf is weak, it should be allowed to suckle its mother for 3 or 4 days. After removal from its dam, the calf should be tethered in a dry, sheltered place for several days.

It is imperative that young cattle have adequate protection against cold winds and inclement weather, and if a suitable place is not available, it would pay to construct a small shed convenient to the dairy in which the very young calves could be housed during bad weather.

The young calf must be taught to drink from a bucket, and the simplest way of doing this is to keep it without milk for at least 12 hours, then allow it to suck fingers which are immersed in a small quantity of milk in a bucket.

Calves should be fed 3 times daily for the first fortnight wherever possible, and on farms where only a small number of calves are reared it requires little more trouble than feeding twice. However, if that is not practicable, the twice-daily feeds should be spaced as evenly as possible. The young calf's stomach is comparatively small and designed to deal with only small quantities of milk taken at frequent intervals. In the process of digestion of milk a curd is formed by the action of rennet derived from the calf's stomach, and the curd is then digested by the pepsin of the stomach juices. When reared on the mother the calf feeds frequently and small curds are formed which are readily penetrated by the pepsin. When milk is fed in comparatively-large quantities, with long intervals between feeds, a large, dense curd is formed which is slowly and imperfectly penetrated by the gastric juice. At the next feed this partially-digested curd forms a core for the formation of a larger and denser curd, and eventually the calf suffers from severe indigestion and scours.

Importance of Colostrum

The mother's milk should be fed to the calf for the first 4 days. This is of prime importance, as the first milk, or colostrum, differs in constitution from ordinary milk for very specific purposes. First, it has laxative properties and removes faecal matter from the calf's rectum while stimulating bowel movements. Secondly, it is rich in vitamin A, thus giving the calf protection against infectious diseases. The normal calf is deficient in vitamin A at birth, but receives adequate supplies both for immediate requirements and for storage in the liver from the colostrum of the mother, provided she has fed on ample fresh pasture or good-quality hay during pregnancy.

Colostrum is also rich in antibodies which are derived from the dam's blood, and these give the calf some degree of passive immunity to many infectious diseases, particularly white scours. This immunity is later reinforced by exposure to natural infection, but without the protection afforded by the colostrum the calf is ill equipped to deal

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Heading photograph by National Publicity Studios.

with disease-producing bacteria. Finally colostrum contains a much higher proportion than ordinary milk of proteins and minerals, such as calcium and phosphorus, required for the rapid body growth which takes place during the first few weeks of the calf's life.

Method of Feeding Milk

Colostrum should be fed warm immediately it is taken from the cow, but when the herd milk is being fed to calves it should first be warmed to 100 degrees F. When calves are 4 to 6 weeks old they can be fed cold milk without any risk of causing indigestion. Fresh milk is preferable for calves, but if it must be fed sour, the calves should be given sour milk at all feeds and not sour and fresh milk alternately.

Milk from most dairy cows is richer in butterfat than Nature designed for the calf, and it will be more digestible if it is diluted with boiled water to reduce the butterfat content to 3.5 per cent. This can be done simply by adding to each 10lb. of milk 1½lb. of water for each 0.5 per cent. in excess of 3.5 per cent. butterfat. For example, if the herd milk averages a 4.5 test, 3lb. of water should be added to each 10lb. of milk.

This practice is strongly recommended, as it results in a softer and more easily digested curd in the calf's stomach.

[*Smith and James photo.*

An excellent layout of race, shed, yard, and feeding bails.

Feeding buckets should be kept scrupulously clean or the risk of infectious scours is greatly increased. After use they should be rinsed thoroughly with cold or tepid water, then scalded with boiling water, and kept in a clean, well-ventilated place.

The feeding of calves in troughs is very undesirable, as the fast-drinking calf gets more than its share of milk. Feeding from buckets in the paddock is equally unsatisfactory, as it involves much knocking about of the calves, and the measuring of the quantities fed to each calf is very rough and ready. The only satisfactory method of feeding is in calf bails, where each calf is assured of its proper ration of milk and dry feed. The construction of such bails is described later in this article.

The best-quality hay should always be made available to the calves, and they will begin to eat small quantities at 2 to 3 weeks old, at the same time beginning to graze a little. This induces cudding and stimulates the development of the other stomach compartments, with the result that at weaning the calves receive practically no check, as their digestive organs are fully developed.

Milk must be fed sparingly to calves for economic reasons and therefore it must be replaced by other feeds. The most suitable is fresh, young pasture, as it is rich in protein, minerals, and vitamins and is easily digested. One pound of good pasture is equal in nutritive value to 2lb. of separated milk and, as calves are unable to digest fibre until they are 5 or 6 months old, only the best-quality hay and good young pasture should be provided for their use.

Calves should always have access to an adequate supply of clean water.

Feeding Whole Milk

Calves should be given 1lb. of milk daily for every 10lb. of body weight, so the quantity will vary according to the size and breed of the calf. Average birth weights of calves of the commoner breeds are Jerseys 55lb., Guernseys 65lb., Ayrshires 70lb., Shorthorns 75lb., and Friesians 85lb.

Therefore the average Jersey calf should receive 5½ to 6lb. of milk daily during the first week, increasing to 7lb. during the second week, and thereafter increasing gradually until it is receiving 15lb. daily at 6 to 8 weeks old. (A gallon of milk weighs about 10lb.)

Whatever method of feeding is to be adopted, the feeding of whole milk is usually necessary for the first fortnight, though strong, vigorous calves with care may be put on to separated milk as early as 10 days. Weak calves should be fed only whole milk for at least 3 weeks.

Feeding Skimmed Milk

The main food constituent removed from milk by separation is butterfat, and to make good the deficiency concentrates rich in starch or fat, such as barley and linseed, must be fed. The change from whole milk to skimmed milk must be gradual and should be carried out during the calf's third week.

Should the calf develop scours during the change, whole-milk feeding should not be reverted to. The calf should be starved for 24 hours, being allowed only boiled water, and given 2oz. of castor oil. A gradual return to normal feeding should be made, milk diluted with an equal amount of water being allowed on the second day and on the next day 3 parts of milk to 1 of water.

During the fourth week the calf should be receiving 10lb. of skimmed milk daily, and this should be supplemented with a small quantity of meal —about ¼lb. The amounts are gradually increased until at 3 months old each calf is receiving 15lb. of milk and 2lb. of meal concentrate daily. The meal is best fed dry and should be placed in the bottom of the bucket when the calf has almost finished drinking its milk; this helps to reduce the tendency of calves to suck one another. If linseed meal is used, it should be soaked for 12 to 36 hours in cold water or boiled in water until it forms a jelly to render its hard outer coat digestible.

These meals are palatable and taken readily by calves, and the choice of meal depends entirely on cost and availability. The nutritive value of commonly used meals compared with that of skimmed milk are:—

1lb. of barley meal = 8lb. of skimmed milk
1lb. of linseed meal = 8½lb. of skimmed milk
1lb. of wheat meal = 8lb. of skimmed milk
1lb. of oat meal = 7lb. of skimmed milk
1lb. of meat meal = 10lb. of skimmed milk

A mixture of meals is more palatable than a single meal and any of the meals mentioned may be used, but if meat meal is included, it should not constitute more than 10 per cent. of the mixture.

The table which follows is a chart for feeding calves on skimmed milk and meal concentrate. The quantities given are suitable for the average Jersey calf, but feeding charts should not be too rigidly adhered to. Calves are individuals, varying in their ability to digest food, and the best measure of the quantities to be fed is the progress and physical development of the calf. The accuracy with which these can be judged is one criterion of the good stock man.

FEEDING AND REARING DAIRY CALVES

[*Smith and James photo.*

Yard and feeding bails next to the milking shed.

FEEDING SKIMMED MILK AND MEAL CONCENTRATE

Age of calf	Whole milk (lb.)	Skimmed milk (lb.)	Meal (lb.)
1st day	On mother		
2nd to 4th day ..	Colostrum (5½)		
5th to 7th day ..	6		
2nd week	7		
3rd week	Change to skimmed milk		
15th day ..	6	2	
16th day ..	6	2	
17th day ..	4	4	
18th day ..	4	4	
19th day ..	2	6	
20th day ..	2	7	
21st day ..	1	8	
4th week		10	¼
5th week		10	½
6th week		10	¾
7th week		12	1
8th week		12	1¼
9th week		12	1½
10th week		14	1½
11th week		15	2
12th week		15	2
4th to 6th month ..		12	3

Whey Feeding

Suppliers to cheese factories must rely on whey as the basis of the calf's diet. Whey is deficient in both proteins and minerals, and therefore a supplement which is rich in both of these food constituents must be provided. The most suitable concentrate to meet these requirements is meat meal, which is reasonably cheap and plentiful. However, it is unpalatable to calves and it will give better results if mixed with barley, oat, or linseed meal in the proportion of 1 part of meat meal to 2 parts of cereal.

Greater care must be exercised in changing from whole milk to whey feeding. It should be done gradually, preferably taking 2 weeks to complete the change, as a sudden change is likely to cause an outbreak of scours. Boiling milk before mixing it with whey is advisable to prevent it coagulating, and if whey has to be kept for some time before it is fed to calves, it should be boiled to check acidity.

After the calf's first 2 weeks on whole milk, whey can be substituted for milk gradually, the change being completed during the next 2 weeks. On the first day of the change 1½oz. of meat meal mixture should be given and this should be increased gradually until the calf receives 10oz. when it is 5 weeks old. The quantities are increased to a maximum of 15lb. of whey and 16oz. of meal mixture when the calf is 10 to 12 weeks old. The following table is a whey-feeding chart, but the amounts fed must be varied to suit the needs of individual calves.

FEEDING WHEY AND MEAL CONCENTRATE

Age of calf	Whole milk (lb.)	Whey (lb.)	Concentrate (oz.)
First 2 weeks ..	Normal feeding		
15th day	7	1	1½
17th day	6	2	2
19th day	5	4	3
21st day	4	5	4
23rd day	3	6	5
25th day	2	8	6
27th day	1	10	8
5th week		11	10
6th week		12	10
7th week		12	12
8th week		14	12
9th week		14	16
10th to 12th week		15	16
4th to 6th month		12	12

Feeding Dried Buttermilk

Pure buttermilk has the same feed value as skimmed milk, but may contain varying quantities of added water. Dried buttermilk powder is more uniform in nutritive value and is suitable for calf feeding where only limited quantities of whole milk are available—for instance, on many town-supply dairy farms.

To prepare the dried buttermilk for feeding, mix 1lb. of the powder with a small quantity of cold water and stir it to make a smooth paste, breaking up all the lumps. Add hot water to make 1 gallon and stir thoroughly. It should be fed to calves at a temperature of 100 degrees F.

After the first 2 weeks on whole-milk feeding, buttermilk may be substituted for whole milk during the next 10 to 14 days, the quantities fed being the same as for skimmed-milk feeding. Dry meal should be fed from the end of the third week. As buttermilk powder is an expensive feed, it is desirable to wean the calf as early as possible, and this can usually be done when the calf is 10 to 12 weeks old. It should be fed 3lb. of meal concentrate daily from weaning until it is 5 months old.

The early-weaned calf has to rely to a greater degree on concentrates for its nutrition, and for this reason a meal mixture is preferable, as probably it would be more palatable and better balanced than a single meal. The following is a suitable formula:—

	lb.
Crushed oats	40
Barley meal	40
Buttermilk powder ..	20
Steamed bone flour ..	½
Ground limestone	½
Coarse salt	½

This formula can be varied according to circumstances; for example, wheat or maize meal could replace either oats or barley meal, and pea meal would make a useful addition. Meat meal could be included in quantities up to 10 per cent. of the mixture. Cod-liver oil should be given twice daily from the 4th to the 10th week.

Rearing on Limited Whole Milk

As may be necessary on farms where skimmed milk and other products are not available, calves can be reared successfully on a minimum of whole milk, though they may not thrive as well as calves fed on skimmed milk until 18 weeks of age or older. The method may be used on town-supply dairy farms as an alternative to buttermilk feeding.

The calf is fed in the usual way for the first 4 weeks—on the mother the first day, mother's milk until the 4th day, and thereafter whole milk at the rate of 1lb. daily per 10lb. of body weight. From the 5th week on, decreasing amounts of whole milk are fed, and the calf is weaned at 3 months. The following daily quantities of whole milk are recommended:—

To the end of the 1st week: 6lb.
To the end of the 2nd week: 8lb.
To the end of the 3rd week: 8lb.
To the end of the 4th week: 9lb.
To the end of the 5th week: 8lb.
To the end of the 6th week: 7lb.
To the end of the 7th week: 5lb.
From 8th to 10th week: 4lb.
From 11th to 12th week: 2lb.

FEEDING AND REARING DAIRY CALVES . . .

From the end of the second week warm water should be added to bring the total volume fed per day up to 1 gallon. By this method a calf can be reared on less than 48 gallons of whole milk, but increasing the quantity may be necessary if calves do not thrive on these amounts.

In this method of rearing the provision of the best-quality hay and good pasture is particularly important. If possible the hay should be lucerne or clover hay; if meadow hay is used, it should have been cut early and got in dry. A good supply of clean water must also be provided for the calves.

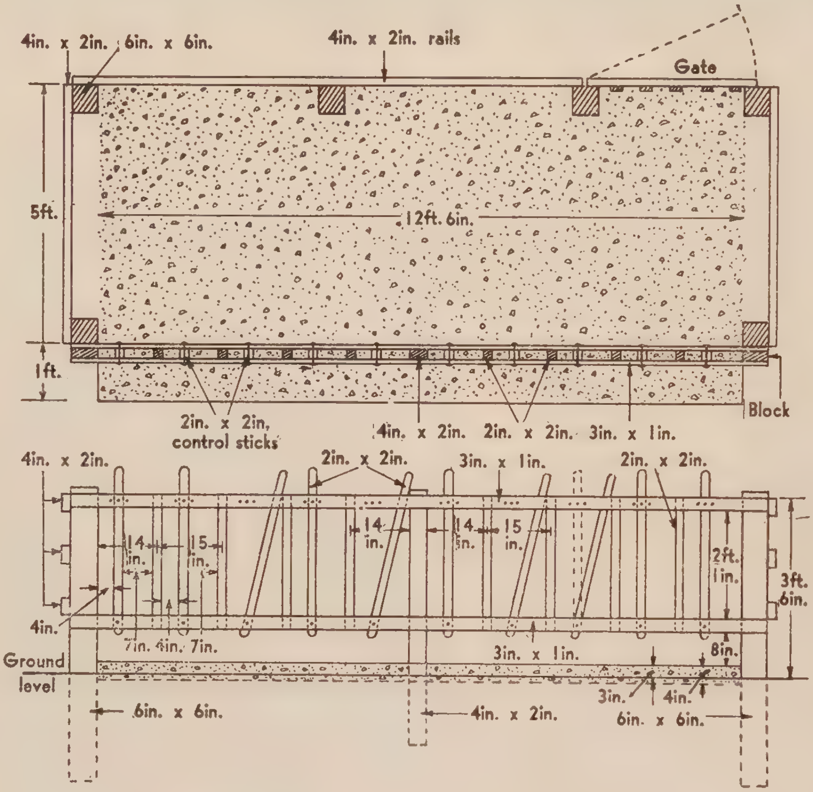
Calf Bails and Houses

Individual feeding of calves is necessary to ensure that each calf receives its proper share of milk and supplement, and the only practical method is by means of calf bails. The use of bails educates the young animals for the milking shed and, more important still, the calves can be held for several minutes after feeding and so prevented from sucking each other. Calf bails also provide a useful place for such operations as vaccination against blackleg and contagious abortion.

Combined feeding bails and houses may be built to elaborate plans, but such layouts are seldom necessary. A design for a simple set of feeding bails, with concrete yard, for 10 calves is shown on this page, and it can be modified or extended to suit requirements.

If a shed is required in association with bails, it should face north to admit sunlight and have the front closed with half doors only. A shed 12ft. 6in. by 9ft. would accommodate at least 12 calves; the height need not be more than 6ft. 6in. in front. The floor should be of concrete or close tongued-and-grooved timber. Alternatively, a simple open-fronted shed for shelter from cold or wet weather may be provided, quite apart from the bail structure.

PLAN AND ELEVATION OF CALF-FEEDING BAILS



DIMENSIONS

Yard—6ft. x 12ft. 6in., concreted, including 1ft. in front of the bails, 4in. thick. Bails in front for 10 calves. Fenced on three sides with 3 4in. x 2in. rails to a height of 3ft. 6in. above ground level or 3ft. 3in. above the concrete. Access by gate at back.

Bails—Top and bottom made with double lengths of 3in. x 1in. timber, 2in. apart to take control sticks and supports, which are of 2in. x 2in. hardwood fencing battens. Width per calf about 15in.

MATERIALS

Bails—4 pieces of timber 13ft. 6in. x 3in. x 1in.; 1 post 4in. x 2in.; 8 battens 2ft. 7in. x 2in. x 2in.; 10 battens 3ft. 3in. x 2in. x 2in. for control sticks; 4 blocks 6in. x 3in. x 2in.; 10 3/8in. bolts and nuts for bottoms of control sticks; 10 3/8in. bolts to peg control sticks.

Yard—6 posts 5ft. 6in. x 6in. x 6in.; 6 pieces 5ft. x 4in. x 2in. for sides; 3 pieces 9ft. x 4in. x 2in. for back.

Gate—12ft. of 4in. x 2in. and 12ft of 4in. x 1½in. timber.

Concrete—About 20 cub. ft.

Weaning

Though weaning is a critical time in a calf's life, much preparation can be made for it by providing the animal with good pasture and high-quality hay during the first few months of its life. Where possible, calves should be rotationally grazed ahead of the herd from 4 weeks of age onward, being moved to a fresh paddock every 3 or 4 days. At least 7 or 8 paddocks ought to be available for the calves, which should never be left on one paddock for more than 5 days. On farms where rotational grazing of calves from 4 weeks old is not practicable, the calves may be set stocked until 4 months old in a paddock of good-quality grass which has previously been spelled for about 3 months.

At 4 months old the ruminant stomach is fully developed and the grazing habit well established, so that the calf has an increasing need for good pasture. Calves are by nature very selective grazers and will soon eat out the most palatable areas of grass in a paddock, leaving what appears to be ample good feed, but what is in fact too rough and unattractive for their fastidious taste. If the calves are not moved immediately to a fresh paddock, they will soon lose weight. Set stocking—keeping calves on one paddock for long periods—also increases the risk of severe worm infestations because of the calf's resistance to worms being lowered by undernourishment and because of heavy contamination of the pastures with worm eggs.

The best age for weaning depends on the progress made by the calf and on the availability of milk for calf feeding. The longer milk can be fed to the calf the better. The most usual age for weaning is between 4 and 6 months, though some calves may be weaned at 3 months where the milk supply is limited. Calves should be fed once daily for 2 or 3 weeks before they are weaned finally and a supply of good drinking water should be available.

Calves respond to kindness and quiet handling, and their confidence and trust in human beings are demonstrated by the ease with which they become accustomed to the routine of the milking shed. A good quiet cow is always better than a good nervous cow.

Green Peas a Popular Home Garden Crop

FEW vegetables are more popular or as rich in vitamins as green peas. They are a very good source of vitamins A, B_1, B_2, and C, and though they are not heavy yielding in comparison with such crops as carrots or cabbage, they deserve to be grown by all home gardeners who have sufficient space. This article by A. G. Kennelly, Vegetable Instructor, Department of Agriculture, Christchurch, describes the culture of peas and the different types and varieties most suitable for growing in home gardens.

[*Green and Hahn Ltd. photo.*

Pods of W. F. Massey peas, a variety of the early dwarf class.

AS most varieties of peas have a relatively short season of harvesting, it is important to arrange sowings so that as far as possible continuity of supply is assured. This may be done by making regular fortnightly or 3-weekly sowings during spring and summer of varieties having maturity periods nearly similar or preferably by sowing according to their maturity periods different varieties selected for their yield and for their adaptation to the climatic conditions to which they are likely to be subject during the period they are grown.

Soil Preparation

Peas do not thrive in hot dry weather; they grow best in cool but not excessively-cold conditions and in deeply-cultivated, moist, well-drained soils containing plenty of humus. Soil preparation should be thorough; most soils should be deeply dug to improve aeration and drainage. In the home garden peas usually do best following a crop that was well manured with organic and inorganic manure. Organic manure should be applied some time before sowing. Too-heavy manuring, particularly with nitrogenous manures, tends to promote excessive soft vegetative or straw growth and makes the crop liable to damage from weather and disease. Most home garden soils, however, benefit from a moderate dressing of organic manure such as compost or well-rotted farmyard or stable manure. A dressing of manure is especially desirable for the tall-growing, mid- and late-season varieties. It should preferably be incorporated in the second spit some weeks before sowing, as peas frequently fail because the roots of the very young plants enter a mass of manure that is very rich or is not properly rotted.

Crop failures are also often caused by poor drainage or inadequate liming, though liming should not be too heavy, as a neutral to slightly-acid soil suits most pea crops. An annual dressing of 3 to 4oz. of lime per square yard will usually be found suitable, but heavier dressings may be advisable in high-rainfall districts. On soils of fairly high fertility, for example, virgin soils or those that have been heavily dressed with organic manure for a previous crop, fertiliser applications need not be heavy. A dressing of about 1 or 2oz. of superphosphate per square yard will usually prove sufficient. On most garden soils a complete fertiliser such as a mixture containing about 6oz. of sulphate of ammonia, 24oz. of superphosphate, and 3oz. of muriate of potash applied at the rate of about 1oz. per square yard will usually give very good results. Because peas are highly sensitive to fertiliser injury, care should be taken when applying the mixture to ensure that it is distributed and therefore does not come in contact with the seed.

Effect of Frost

Peas are hardy, but heavy frost is liable to affect the setting of the flowers, and frost following a mild period during which soft growth has developed may damage the haulms. In districts where winter conditions are severe autumn sowing should be sufficiently early to enable the young plants to become established, but not so early that they make soft growth. Autumn sowing is not recommended as a general practice, as losses may be serious in severe weather, but in well-drained soils in districts where winter conditions are not too severe it is usually satisfactory. In most districts, however, autumn-sown crops are usually little ahead of crops sown in favourable conditions in spring.

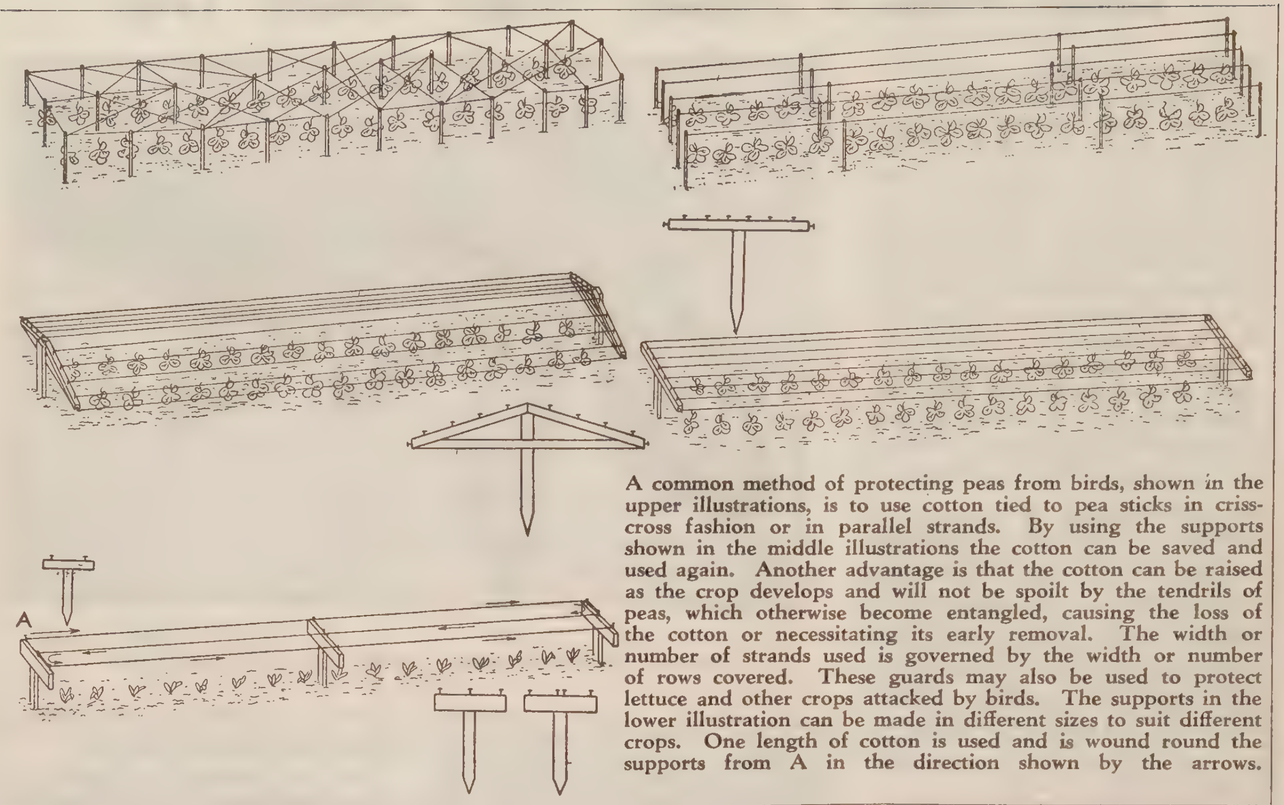
For autumn and spring sowings seed should be dressed with a suitable seed protectant such as copper carbonate or red or yellow copper oxide in finely-powdered form. The peas should be shaken vigorously for several minutes in a tin containing a pinch or just enough of the chemical to coat the seed. Afterward the excess should be removed by tapping the tin sharply so that unnecessary powder falls to the bottom. Treated seed should not be sown in dry soil. Good proprietary dressings are available from seedsmen and should be used according to the instructions on the container.

Peas are legumes and gather and store nitrogen in the nodules on their roots. They thus have the power to enrich the soil. They do this through the agency of two species of bacteria which have the capacity to make use of the free nitrogen of the atmosphere and to transform it into chemically-combined nitrogen. This nitrogen becomes available to the succeeding crop on the breaking down of the nodules. Peas should therefore be used wherever possible in the rotation except after other legumes.

Seed should be sown 1 or 2in. apart in V-shaped or broad, flat drills which can be drawn out with the hoe 18 to 36in. apart according to variety. Drills should be 2 or 3in. deep, except where conditions are hot and dry, when they should be considerably deeper so that, though the seed should not be covered with more than 1½ or 2in. of soil, the roots will be well down in the cooler and moister soil of the lower levels. This is very important where conditions are dry or where heavy wind is likely, as the plants can be gradually earthed up the stems as they develop. Dwarf varieties should require no other support.

Very tall varieties of peas are best grown against a fence or trellis or on wire netting. Shorter-growing varieties can be supported by twiggy or woody pieces of manuka with many branches or the prunings of other shrubby subjects. Alternatively, thin laths or sticks can be pressed into the ground on an angle on either side of the row as shown in the diagram on page 131. The parallel line of sticks on either side of the row should point in opposite directions so that when glanced at from the side they appear to be criss-crossed. Another good

METHODS OF PROTECTING PEAS FROM BIRDS



A common method of protecting peas from birds, shown in the upper illustrations, is to use cotton tied to pea sticks in criss-cross fashion or in parallel strands. By using the supports shown in the middle illustrations the cotton can be saved and used again. Another advantage is that the cotton can be raised as the crop develops and will not be spoilt by the tendrils of peas, which otherwise become entangled, causing the loss of the cotton or necessitating its early removal. The width or number of strands used is governed by the width or number of rows covered. These guards may also be used to protect lettuce and other crops attacked by birds. The supports in the lower illustration can be made in different sizes to suit different crops. One length of cotton is used and is wound round the supports from A in the direction shown by the arrows.

method is to put in stakes along the sides of the row at intervals of a few feet and support the peas with strings tied to them. A number of strings and very tall stakes may be necessary for tall varieties.

Protection Against Birds

Protection of newly-emerged peas against birds is essential in some districts, though birds are mainly troublesome in early spring, when food is in short supply and is lacking in variety. Pea guards made of wire netting are most effective, provided the ends are blocked, but they should be removed before the peas become entangled in the wire. There are numerous other methods of protection, but their effectiveness depends on thoroughness of application and other factors. Spraying with bitter substances such as an infusion of alum or quassia in water (with soap as a spreader) or dusting the rows with sawdust, lime, sulphur, or superphosphate gives varying degrees of protection. Cotton stretched over the shoots is also effective if a number of strands, which may be criss-crossed or stretched in parallel lines, are used as shown above.

After harvesting it is important to use peas as soon as possible, as they lose sugar and flavour and increase in starch very rapidly unless held at very low temperatures. For best results they should be served within 30 minutes of being picked.

Peas are extremely variable in their characteristics. Vines may be dwarf, half dwarf, or tall, and the foliage which may be light, medium, or dark green, may be slender or it may be robust and vigorous. Pea pods may be straight or curved and may have pointed or blunt ends and according to variety may be from 1½ to about 7½in. long.

Seed varies greatly in size and weight and when dry may be either smooth and rounded or dimpled or wrinkled and be creamy, green, or greyish-green. Varieties of peas are usually classed as early, mid-season, and late, though additional groupings such as second early, early main crop, and late main crop are not uncommon.

In general the varieties with rounded seed are hardier and germinate better, but the wrinkled peas are sweeter and have a finer flavour.

Peas are mainly self-pollinating and normally there is little crossing in most lines. The flowers are produced in the axils of the leaves and usually commence at a certain node or height in each variety. Flowers may be solitary or borne in pairs, but rarely appear in threes.

Identification of Varieties

This habit of bearing flowers regularly at a certain node has provided a useful key for the identification of varieties. The node at which a variety blooms indicates its earliness and is also an almost invariable guide to certain other characteristics such as hardiness and variability of the type. For instance, peas that begin to bloom at the eighth to the fourteenth node are in general less variable than those that commence to bloom above this. Such peas usually produce two pods at each node and thus tend to a dwarf type of vine that is comparatively regular

[Green and Hahn Ltd. photo.

Wire-netting guards are effective in protecting young peas from birds. The ends should be blocked and the guards removed before the peas become entangled in the wire.

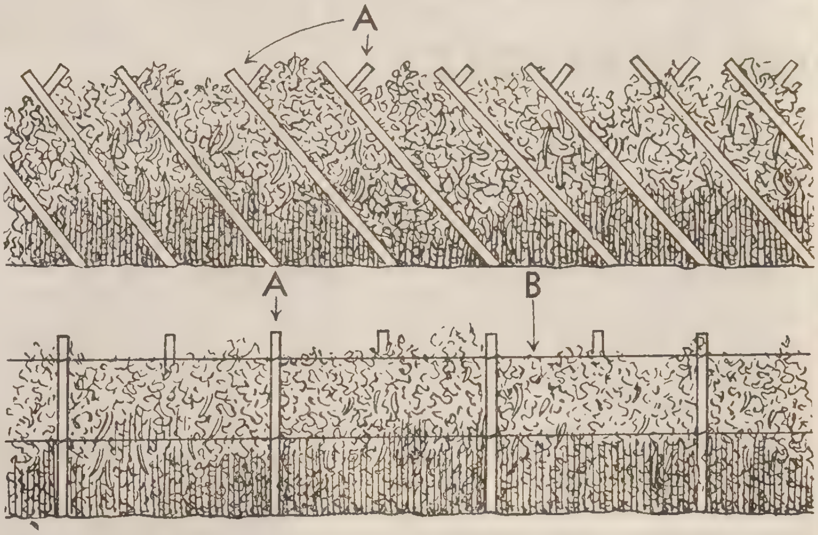
in its characteristics and hardier and more adaptable than the taller types. Because their pods are fairly concentrated, the entire crop borne by the dwarf type of plant matures in a limited time and for this reason, together with the fact that staking is unnecessary, this type of pea is favoured for canning and by market gardeners. Dark-green varieties of the type are especially suitable for freezing.

Some peas of the type which produce their first bloom above the fourteenth node produce large, fine-quality pods with peas very rich in sugar, but in general tall varieties are not superior to the dwarf. The pods of the tall kinds are usually borne singly and the vines are more variable in type than the dwarf kind; they are also more subject to damage from climatic conditions and they mature their pods over a longer period.

Most varieties of peas grown in New Zealand home gardens are of the wrinkled-seeded kinds. They are used as shelling peas; that is, they are shelled and used at once or bottled or canned so that as far as possible their fresh greenness is retained. Round or dimpled peas are not often grown in New Zealand home gardens, but good dimpled-seeded varieties are well worth a trial for autumn or early-spring sowings for shelling and using green or for early sowing for drying, storing, and using boiled. Dimpled peas are commonly sold as packet peas for boiling, and in New Zealand the name marrowfat is now applied by many people exclusively to this type of pea, though it is more applicable to the wrinkled kinds of pea often described by earlier writers as marrow peas. Wrinkled peas are of more recent origin than the other types and date from the time Thomas A. Knight began his work in England in 1787. They quickly became the most popular kind of pea grown and improved varieties are still being produced.

Sugar or edible-podded peas are grown only to a limited extent by home gardeners, but are worthy of more general culture, as good varieties are somewhat like snap beans and should be prepared for the table similarly, though they are best used before they are more than half grown. If left, they can be shelled and used like ordinary peas, though the yield then is less than that of ordinary peas. Some varieties have flowers which rival those of sweet peas. There are both tall and dwarf varieties of sugar peas.

SIMPLE METHODS OF STAKING PEAS



Upper—Stakes (A) stuck into the ground at a slope at frequent intervals on either side of the row. Lower—A double row of strings (B) tied to stouter stakes (A) placed upright at less frequent intervals on either side of the row.

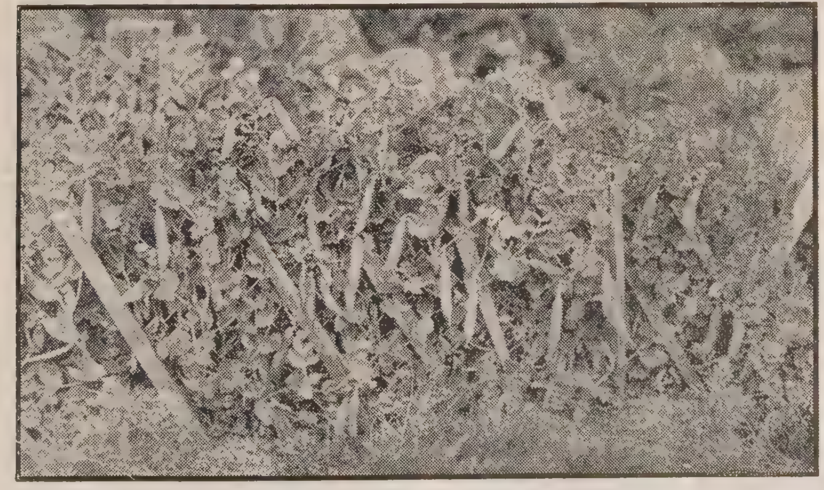
Types and Varieties

It is not easy to classify the many types and forms of peas in a simple, clear-cut manner because of the complexity of their characteristics (that is, tallness or dwarfness, type and colour of seed, type of pod, vigour, and type of vine). Genetically, too, garden peas are rather unstable and in most crops a number of types not true to variety are found. Seed catalogues often list varieties as first early, second early, early main crop, main crop, and late. This usually adds to rather than dispels the confusion engendered by long lists of names, many of which are mere synonyms. The classification used below is based mainly or an English system and includes a majority of the better-known varieties or varietal types grown in New Zealand. Varieties not grown in New Zealand have been included only where the writer considered that they could fill a useful purpose in this country.

Early Dwarf (15 to 30in. high)

There are two groups of wrinkled-seeded peas in the early dwarf class, the gem group and the large-podded group. The gem group is probably the most popular of all groups with home gardeners. The variety known in New Zealand as W. F. Massey is especially popular. Peas of this dwarf early type mature in favourable conditions in from about 68 to 75 days according to variety. Peas in the gem group are very popular for sowing in early spring for early harvesting and for sowing in late summer or early autumn to yield a crop before winter in ground that has been cleared of a spring or early-summer crop. Several varieties are most suitable for canning.

Examples of the gem group are Kelvedon Wonder (syn. W. F. Massey), English Wonder, Little Marvel, William Hurst, and Witham Wonder. Varieties in the large-podded group include the very fine varieties Peter Pan, Blue Bantam, and Laxtons Progress. This type of pea is also very popular among home gardeners, and some varieties are excellent for canning. Growth is sturdy and vigorous and the well-filled pods of good-quality peas are produced in about 70 to 80 days.



[*Green and Hahn Ltd. photo.*

Dwarf peas supported by sloping stakes.

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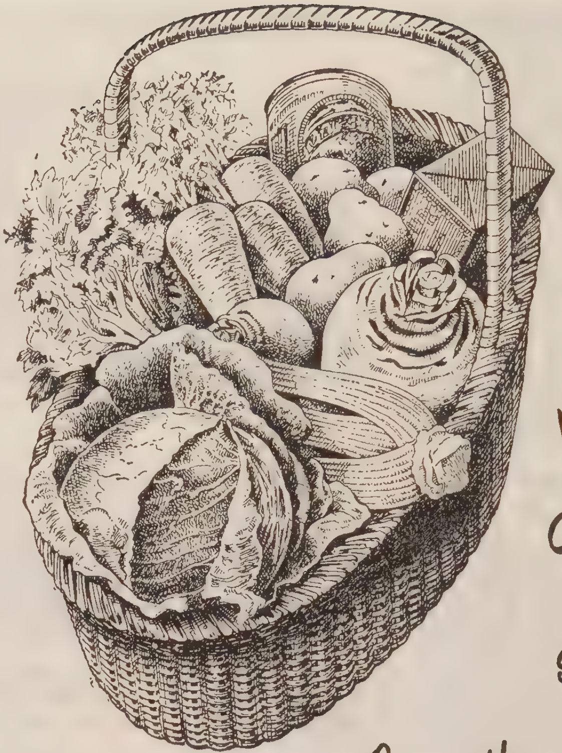

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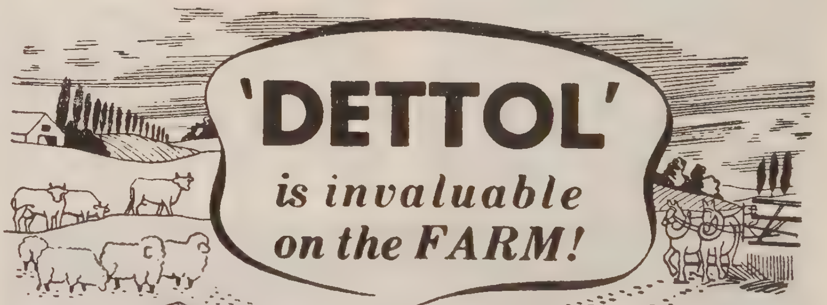

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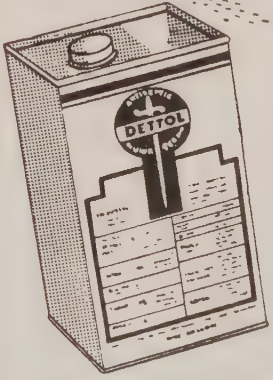

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CULTURE OF GREEN PEAS IN THE HOME GARDEN

[*Green and Hahn Ltd. photo.*

The continuity of supply of peas can be maintained either by sowing at about the same time varieties having different maturity periods or by making regular sowings of the same variety.

Apart from the wrinkled-seeded peas already mentioned, there are a number of fairly good varieties of round-seeded peas in this class that are early and very hardy. They are rarely grown in New Zealand, as they are not as sweet and in general their quality is inferior to that of the wrinkled-seeded types. Two of the best and quickest maturing are Meteor and Eight Weeks. They have not been noticed lately in New Zealand seedsmen's catalogues, but in England both are very popular for late-autumn and early-spring sowing for use as table (shelling) peas. Their earliness and extreme hardiness would justify their cultivation in autumn and early spring in the colder districts of New Zealand. They are also excellent peas for storing dry and using boiled.

Early Tall (30 to 48in. high)

The early tall type of pea is not often grown in home gardens in New Zealand. The first pods become filled in from about 65 to 80 days from sowing. The round-seeded varieties are a little earlier than the wrinkled-seeded. The wrinkled-seeded variety Gradus and a similar though slightly-better variety World Record are occasionally listed in New Zealand seedmen's catalogues, but they have never been grown much in this country. Gradus was for many years one of the most popular varieties in England, but is now largely superseded by Provost.

Of the round-seeded varieties, Alaska and Blue Prussian are worthy of mention. Alaska is rarely grown, but is a useful pea for shelling or drying, and overseas it has been one of the most popular varieties, particularly for canning, for many years. The vine is a slender and light green and bears a heavy crop of small, square-ended, well-filled pods. Blue Prussian is grown in New Zealand as a field pea. It is a very old variety and has many synonyms. It is commonly sold as a packet pea for boiling, but is rather small and is of variable hardness.

Mid-season Dwarf (12 to 36in. high)

Most of the peas in the mid-season dwarf group mature pods in about 80 to 85 days from sowing. There are few round-seeded varieties in the group, but none is grown in New Zealand and there does not appear to be much justification for growing them when there is such a number of easily-grown, good-quality, wrinkled-seeded varieties available. The most popular wrinkled-seeded variety, Lincoln (syn. Homesteader and Greenfeast), is well suited to both home and market garden production, as it is hardy, adaptable, and high yielding. The pods are borne mainly in pairs.

The mid-season dwarf peas as a class can be divided into several fairly distinct groups. For instance, Lincoln (Greenfeast) and Delicatesse (Petit Pois) form one. Both Lincoln and Delicatesse are very good for canning as well as home garden use. The peas of the Delicatesse strain, which originated in France, are small but very succulent and require less cooking than the larger kinds.

Daisy, Giant Stride, Asgrow 40, Greatcrop, and Onward form another somewhat similar and very popular group, and Stratagem and Dwarf Defiance are representatives of another similar though slightly-later group. All are useful mid-season varieties.

Mid-season Tall (36 to 72in. high)

Only wrinkled-seeded varieties comprise the mid-season tall group. Good varieties grow over 6ft. high where conditions suit them, but as they require support and shelter from boisterous weather and are less hardy, uniform, and adaptable to varying climatic conditions than the shorter-growing peas, they are not grown often.

The variety Quite Content is one of the best, though Alderman (syn. Dark Podded Telephone) is the most popular variety and is fairly typical of the group. The large pods are borne singly or in pairs beginning at the thirteenth or fourteenth node. They are produced successionally over a fairly long period, which is usually considered an advantage in the home garden. Other varieties in the group are Duke of Albany and the VC, which is one of the largest-podded peas in cultivation.

Late Tall (42 to 48in. high)

Late tall varieties (for example, Autocrat and Ne Plus Ultra) are now rarely grown in home or commercial gardens in New Zealand. As they require up to 100 days to mature their first pods and they are not usually as high yielding as some of the earlier varieties, this is not surprising, especially in view of the importance in most home gardens of obtaining a maximum yield of good-quality produce from the available land. Ne Plus Ultra is one of the oldest varieties of peas.

Dried Peas

Because green vegetables in New Zealand are usually available in variety and it is possible in most districts to harvest good-quality green peas for all but about 3 or 4 months of the year, few home gardeners grow peas to dry and store. Good strains, however, deserve to be more generally grown in home gardens, because when they are properly cooked they can be used to provide tasty and highly-nutritious meals when green peas are not available. In general the qualities required in a dried pea are that it should be of good eating quality and have a skin that resists splitting. Good colour is also desirable.

Good varieties usually classed as field peas that could be grown more in home gardens are the marrowfat (dimpled-seeded) peas Harrison's Glory, Unica, and Imperial Blue and the smooth blue pea Mammoth Blue, which was introduced by the Agronomy Division of the Department of Scientific and Industrial Research. Another variety worthy of mention is White Prolific, a variety grown as a splitting pea for soups and also bred by the Agronomy Division.

Developments in the Use of Penicillin for Controlling Mastitis

DURING the season just ended New Zealand dairy farmers for the first time have been able to obtain penicillin in suitable form and in adequate quantities for the treatment of all cases of mastitis, stated J. F. Filmer, Director of the Animal Research Division, Department of Agriculture, in a paper delivered at the Dairy Farmers' Week at Massey Agricultural College recently. Two New Zealand firms have put up penicillin cerate in the now well-known collapsible tubes with nozzles which can be inserted into the teats. Because of temporary difficulties in tube manufacture, supplies were rather short during the first month or two of the season, but since then ample quantities have been available and penicillin has been used very widely by dairy farmers in the treatment of mastitis.

IT has been possible to obtain samples for bacteriological examination from only a small percentage of the cows treated, but R. W. Roach, Veterinary Research Officer, Ruakura Animal Research Station, has made some interesting observations. He was able to make before and after treatment bacteriological examination of 91 clinical quarters in 77 cows, all of which were infected with *Streptococcus agalactiae*.

In 90 per cent. of the quarters there was a return to normal milk production; the germs were destroyed in 66 per cent. of quarters, but not in the other 24 per cent.

The Herd Recording Department of the Dairy Board is collecting data concerning the effect of treatment from a number of herds for which mastitis data have been kept for some years, but there has not yet been time to analyse the results.

The general reports have been very encouraging and complaints have been surprisingly few.

Negative Results

Milk samples were examined from 167 quarters which were reported not to respond to penicillin treatment. Strangely, no harmful germs could be found in 91 of these samples, and no explanation can be offered to account for the failures in these cases. In 28 quarters germs were found which are not affected by penicillin. It has always been realised that mastitis caused by such germs would not respond to penicillin, but fortunately only a small percentage of such cases occurs.

In 33 quarters *Str. agalactiae* was found and testing in the laboratory afforded no evidence that it had acquired any unusual resistance to penicillin. Obviously, in these cases the penicillin had not made contact with the germs in sufficient concentration for a long enough period. This stresses the necessity for promptness and care in the administration of penicillin.

Faults in Treatment

A few cases of faulty treatment have been reported. It cannot be overemphasised that the best results will be obtained only if treatment is begun as soon as any abnormality in the milk or the udder is detected. A delay of even one day may be quite serious. Carrying out the treatment carefully and thoroughly is equally important. The whole contents of the tube must be injected. Observations have shown that even when the greatest care is taken about 10 per cent. of the contents is left in the tube, and the manufacturers allow for this. If care is not taken, a much larger proportion may be wasted and the dose will then be inadequate. If any of the contents of a tube are accidentaly lost—for example, through a cow kicking—another tubeful should be injected.

A number of cases have been reported in which farmers have used only 1 tube. The temptation to do so is great when the quarter appears normal 24 hours later, and it must be admitted that some cases do clear up satisfactorily after treatment with only 1 tube; quite a few of these would probably have recovered without any treatment. However, the practice is extremely dangerous, as it is likely to lead to the development of resistant strains of organisms. The mechanism by which this occurs is quite simple: In any congregation of germs there will always be a few which are more resistant to penicillin than the others; if too small a dose of penicillin is given, or if treatment is stopped too soon, the more susceptible germs are killed, but the few more resistant ones survive and in the absence of competition they multiply rapidly.

Therefore, all cases should be treated early, a full course of 3 tubes should always be given, and the whole contents of 1 tube should be injected at each treatment.

Use of Larger Doses

Recently some farmers have used tubes containing doses of 50,000 or 100,000 units of penicillin instead of the standard tube, which contains 25,000 units. In special cases veterinarians may advise the use of larger doses, and this advice should be followed, but in general no better results are obtained than with the standard dose, and the very much greater cost is not justified (27s. 6d. per dozen for 100,000 units as against 13s. 6d. per dozen for 25,000 units). It must be emphasised that 1 dose of 100,000 units is not as effective as 3 doses of 25,000 units given at 24-hour intervals; in fact, if the latter treatment is not effective, generally it is better to give 1 or 2 more doses of the same size than to increase the size of the dose.

Where the larger doses are used special precautions must be taken by suppliers to cheese factories. Penicillin is particularly active against cheese starters, and during the past season a few cases have been reported in which cheese quality was deleteriously affected by milk containing penicillin. Where the standard dose of 25,000 units is used, this can be prevented by withholding milk from treated quarters from the start of treatment up to and including that taken at the second milking after treatment ceases. Where larger doses are used it is essential to exclude the milk up to and including that taken at the fourth milking after the last injection.

Treatment at Drying Off

Last year the suggestion was made that streptococcal mastitis might be reduced or perhaps eliminated by the treatment of all quarters of all cows at drying off. A large-scale experiment conducted in collaboration with the New Zealand Dairy Board and a number of veterinarians has been completed, but there has not yet been time to collect and analyse results. However, some results are available from a smaller but more intensive experiment conducted by Roach.

Fifty-five cows infected with *Str. agalactiae*, but not showing obvious symptoms of mastitis, were treated with 1 tube of 25,000 units per quarter at or after drying off. Of these cows 84 per cent. calved free from infection and 73 per cent. remained free from infection for 3 months after calving. In 11 herds containing 616 cows in which all quarters had been treated with 1 tube of 25,000 units of penicillin at or after drying off, milk samples were examined bacteriologically after the subsequent calving. Three herds calved free from infection and the average incidence of infection in all herds was 4.8 per cent. of cows and 1.4 per cent. of quarters. The average incidence of infection in untreated herds is about 24 per cent. of cows.

Further observations are being made in a few herds at the end of this season. One tube of 25,000 units of penicillin is being injected into all quarters of all cows, the teats are being disinfected, and special attention is being paid to treatment of sore teats. This work is being done under direct veterinary supervision, and bacteriological examination will be made of samples from all quarters after calving.

At present it is not possible to give an exact estimate of the effect of treatment at drying off on the incidence of obvious mastitis in the following season, but it seems certain that it will cause some reduction. Perhaps the best advice that can be given at this stage is along the following lines:—

Carefully examine milk from all quarters of all cows with a strip cup just before they are dried off.

Treat all obviously-affected quarters with 3 tubes of 25,000 units of penicillin, at 24-hour intervals, giving the last tube after the last milking.

In badly-infected herds inject 1 tube of 25,000 units of penicillin into every quarter of every cow after the last milking.

Whether the increased factory cheques resulting from an unknown reduction in the incidence of mastitis would justify the expenditure of 4s. 6d. per cow can only be a subject of speculation. Farmers have been known to make much wilder speculations.

Lucerne : Points to be Observed in its Establishment

SEASONAL NOTES Contributed by the EXTENSION DIVISION

THE writer has not seen a successful lucerne crop in a few of the minor farming districts of New Zealand, for example, northern Taranaki and the west coast of the South Island, though of course it is possible it may have been grown successfully in some or all of these districts. Really successful fields of lucerne, however, have been seen in all the major districts, and outstandingly-successful stands in Poverty Bay, Hawke's Bay, Manawatu, Wairarapa, Marlborough, Canterbury, and Otago.

IN New Zealand lucerne has been successful on all types of soils except peats and clays (which are really far from common) and those with hard pans or water relatively close to the surface. On ordinary well-drained loams and sandy soils lucerne is often very successful.

It is therefore not easy to explain why a relatively small acreage of lucerne is grown in New Zealand today when a successful stand of lucerne may be made very productive of high-class feed which is available for stock at critical periods.

However, it is certain that many farmers are reluctant to try to grow lucerne because they think it is a somewhat difficult crop of which to make a success. This view may have several causes. First, about 30 years ago many farmers grew lucerne without making a success of it, and their sons, who are today middle-aged men, remember that it was grown with only indifferent results on the properties they now farm. What these middle-aged farmers do not know is that some of the so-called authorities of 30 years ago, including some officers of the Department of Agriculture, advocated, at times quite strongly, practices in the growing of lucerne that would be frowned on today.

Again, some growers of lucerne today do things which militate against success, and other farmers who have not tried lucerne do not fail to note the lack of success and hence decide that lucerne is not worth trying.

Why There are Failures

What are these practices that militate against success? A main one is to take the first cut of the season too late. Lucerne is normally ready for its first cut before the weather is settled enough for haymaking, and when it is ready the lucerne should be cut and made into silage, along with the produce of early-mown pastures if necessary.

Leaving over-mature lucerne crowded with weeds, especially grasses, weakens the stand, as late cutting encourages grass competition and destroys the new shoots from the crown which are coming forward for the next crop. The longer weeds are left without cutting the longer they compete with lucerne, whereas when the cut is taken at the correct stage of growth it is usually followed by an almost pure growth of lucerne without any competitive growth.

Another practice leading to failure is sowing at the wrong date, either too late or too early. The suitable date varies from district to district, but if the farmer has any doubt about the suitable time for sowing lucerne, he should ask the Department of Agriculture's local instructor.

Another cause of failure with lucerne is the removal of the last growth of the season in an unsuitable manner. Preferably, lucerne at the beginning of the winter should have several inches of growth, which serves two purposes: it builds up the crop for the following season and, by acting as a covering to weeds, it tends to check them. Some farmers when they have a half cut of lucerne at the end of the season seem to feel that it must be used and so, as it is not worth mowing, they graze it off. This is really bad practice, because weeds, including grasses and clovers, especially those which grow in lucerne's dormant season, are encouraged at the expense of the lucerne.

Another point which was mentioned recently by the English "Farmer and Stockbreeder" of September 21, 1948, was: "The idea with lucerne is to let it store up a good reserve of food in the roots for next season's early growth."

[*Ministry of Works photo.*

Successful Establishment not Expensive

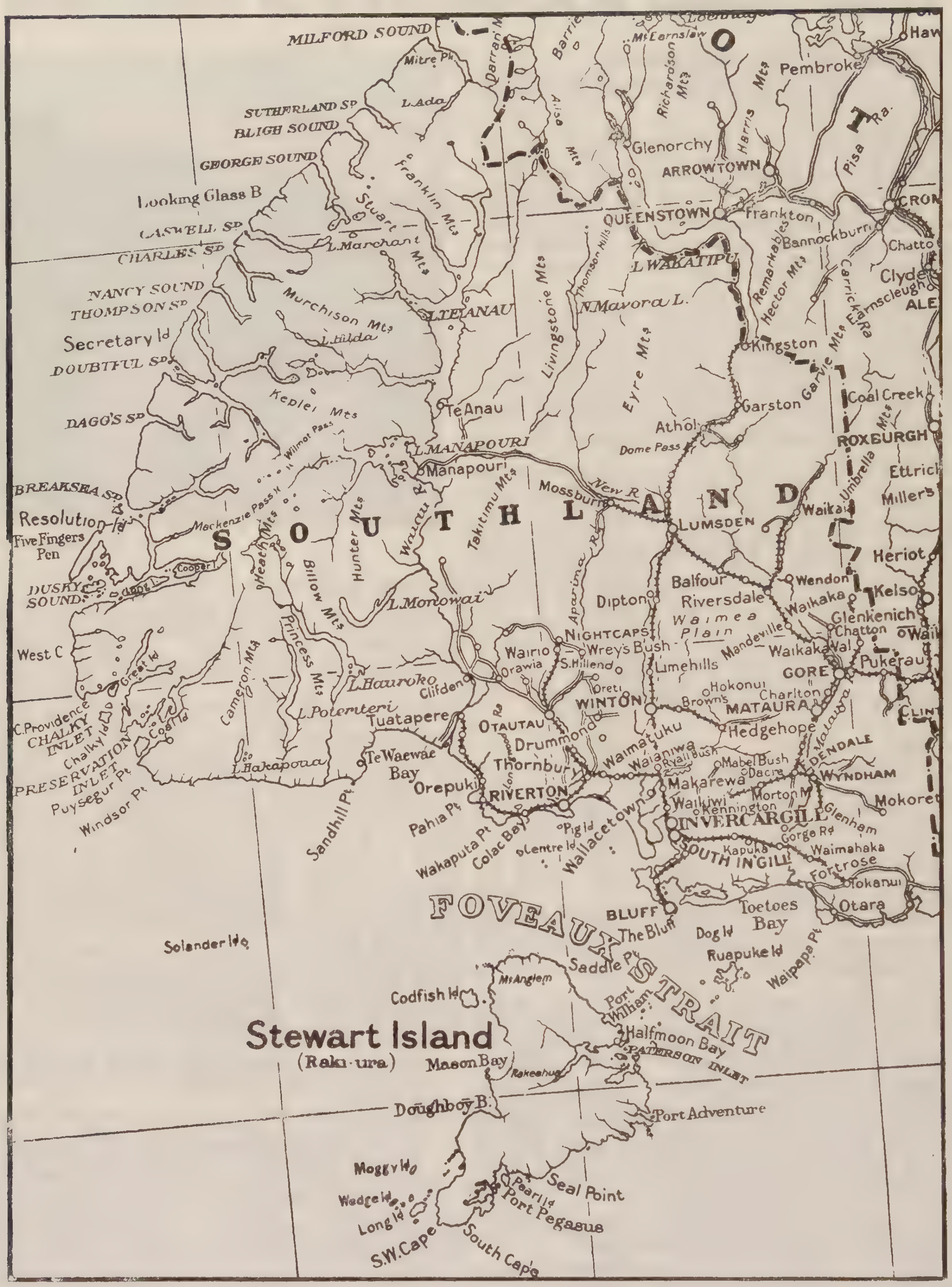
Despite much opinion to the contrary, lucerne is not an expensive crop to establish; it probably costs less today than a good permanent pasture. It requires a good preparation of the seed-bed begun well before sowing, and often, because of trouble with weeds that might otherwise arise, it is well for lucerne to follow an old pasture, but it may quite well follow real cleaning crops such as a well-grown crop of potatoes. Usually the use of lime and phosphatic manure at time of establishment is advisable. Inoculation, which may serve only as an insurance, is very desirable and it is sometimes essential. If a farmer has not previously grown lucerne successfully, he should consult the Department's local instructor.

As lucerne, when successful, is a most valuable crop, farmers should give it the conditions it requires as far as possible. It is not very exacting in its soil requirements, but it thrives on a well-drained soil of open texture. The preparation of the seed-bed should be similar to that for a permanent pasture. When lucerne is to follow pasture, the pasture should be broken up early by a skim ploughing, to be followed by deep ploughing and subsequent cultivation to make a firm seed-bed. To assure a minimum of weed seeds in the surface layers surface cultivation is undertaken to destroy crops of seedlings before sowing of the lucerne. Generally the sowing of lime and reverted superphosphate with the lucerne seed is advisable; only in exceptional cases, such as on the schist soils in Central Otago, may liming and fertilising be omitted.

To sum up:

1. If preparatory cultivation for lucerne has not already been carried out, it should as a rule be begun early in spring.
2. In selecting a field for lucerne two facts should be remembered: (a) it deserves good soil; (b) it is not capable of battling against weeds, and thus often does better if it follows old grass or a real cleaning crop.
3. Good drainage of lucerne soils is highly desirable.

Thirty-eight years ago Clifton wrote in "The New Zealand Journal of Agriculture' about the Department's opinion of the importance of forage crops: "It esteems lucerne above all others as the most valuable." Today, because of the quantity of hay and of fresh greenfeed which is available from successful lucerne and the time of the year it is available, Clifton's opinion still stands.


MILFORD SOUND
Mitre Pk
L. Ada
SUTHERLAND SD
BLIGH SOUND
GEORGE SOUND
Looking Glass B
CASWELL SD
CHARLES SD
NANCY SOUND
THOMPSON SD
Secretary Id
DOUBTFUL SD
DAGO'S SD
BREAKSEA SD
Resolution Id
Five Fingers Pen
DUSKY SOUND
Cooper
West C
Great Id
C. Providence
CHALKY INLET
Chalky Id
Coal Id
PRESERVATION INLET
Puysegur Pt
Windsor Pt
Franklin Mts
Stuart Mts
L. Marchant
Murchison Mts
L. Hilda
L. TE ANAU
Kepler Mts
Wilmot Pass
Mackenzie Pass
Heath Mts
Hunter Mts
Billow Mts
Princess Mts
Cameron Mts
L. Hauroko
L. Poteriteri
L. Hakapoua
Te Anau
L. MANAPOURI
Manapouri
Waiau R
Takitimu Mts
L. Monowai
Livingstone Mts
Thomson Hills
N. Mavora L.
Eyre Mts
Darran Mts
Barrier
Ailsa Mts
Mt Earnslaw
Richardson Mts
Harris Mts
Glenorchy
ARROWTOWN
QUEENSTOWN
Frankton
L. WAKATIPU
Remarkables
Hector Mts
Pembroke
Pisa Ra.
Bannockburn
Carrick Ra
Chatto
Clyde
Earnscleugh
ALE
CROM
Haw
Kingston
Garvie Mts
Garston
Athol
Dome Pass
Coal Creek
ROXBURGH
Umbrella Mts
Ettrick
Millers
Heriot
Kelso
Mossburn
New R
SOUTHLAND
OTAGO
LUMSDEN
Waikaia
Wendon
Balfour
Riversdale
Dipton
Aparima R
Waimea Plain
Waikaka
Glenkenich
Chatton
Waikaka Val
Mandeville
NIGHTCAPS
Wreys Bush
Wairio
Orawia
S. Hillend
Limehills
GORE
Pukerau
Hokonui
Browns
Charlton
MATAURA
Mataura R
Clifden
Tuatapere
OTAUTAU
Oreti
WINTON
Hedgehope
EDENDALE
WYNDHAM
Drummond
Thornbury
Waimatuku
Waianiwa
Ryall Bush
Mabel Bush
Dacre
Makarewa
Morton M
Mokoreta
Te Waewae Bay
Orepuki
RIVERTON
Wallacetown
Waikiwi
Kennington
INVERCARGILL
Glenham
Gorge Rd
Kapuka
Waimahaka
SOUTH INVERCARGILL
Fortrose
Tokanui
Otara
Sandhill Pt
Pahia Pt
Wakaputa Pt
Colac Bay
Pig Id
Centre Id
FOVEAUX STRAIT
BLUFF
The Bluff
Toetoes Bay
Dog Id
Ruapuke Id
Waipapa Pt
Solander Ids
Codfish Id
Mt Anglem
Saddle Pt
Port William
Halfmoon Bay
PATERSON INLET
Stewart Island
(Raki-ura)
Mason Bay
Rakeahua
Doughboy B.
Port Adventure
Moggy Id
Wedge Ids
Long Id
S.W. Cape
South Cape
Pearl Id
Port Pegasus
Seal Point

[Department of Lands and Survey, Wellington.

FARMING IN NEW ZEALAND

Southland

PROBABLY because of its remoteness, Southland is perhaps the least known of New Zealand's major agricultural districts. Nevertheless, its possibilities are invariably appreciated by visitors from other parts of the Dominion, and those from Great Britain nearly always recognise in the Southland type of farming some of the thoroughness which they have been accustomed to see in their own country. This important farming area, described in this article by A. Stuart, Assistant Fields Superintendent, Department of Agriculture, Dunedin, covers the two extensive counties of Southland and Wallace, together comprising more than 5000 square miles of occupied land, the agriculturally-unimportant Stewart Island, and the practically-uninhabited Fiord County.

SHEEP farming is Southland's main industry, fat lamb production being the most important phase of it. Dairy farming is next in importance, being confined mainly to the coastal and higher-rainfall areas. In the inland and lighter-rainfall districts mixed arable farming predominates.

Three major necessities recognised almost universally in Southland are the provision of adequate winter feed, the use of lime, and drainage. Where they are required all of these have been carried out systematically by individual farmers, with the result that production from the land and the quality of livestock are high by Dominion standards. Further drainage works by local authorities can do a good deal more in the future to bring about greater development.

History of Settlement

Southland's earliest settlers were sealers, who landed at Dusky Sound in 1792. They were followed by the Codfish Island settlement, and in 1837 the first whaling settlement was established, at Riverton. In 1844, Mr. Tuckett, chief surveyor, visited Southland and described the site of Invercargill as a mere bog and totally unfit for habitation. However, in August, 1853, negotiations for the purchase of Southland (then called Murihiku) from the Maoris were completed, and in October, 1856, Mr. J. T. Thomson began survey work and the selection of sites for towns and settlements. In 1855-56 parties of pioneers explored Southland, and later several applications for land were made to the authorities at Dunedin, who discouraged settlement because the land still was considered little better than a swamp. This did not deter settlers from Dunedin landing at Bluff in March, 1856.

In 1861 the province of Southland was established, but this proved a disastrous step, as at that time the population of Invercargill was only 400 and that of the whole province 1500. In 1870 Southland was reunited with Otago.

Large blocks of country were acquired for extensive sheep farming by the early settlers, or squatters as they were called. Probably none of these did greater service to Southland than Mr. Thomas Brydone, superintendent of the Australian and New Zealand Land Company. Not only was he responsible for the development of dairying, which was followed by the erection of the first cheese factory at Edendale in 1882, but in 1890, as a result of initial work in South Otago, liming on an extensive scale was begun on the company's Edendale Estate.

With the development of dairying, liming, refrigeration, and transport, closer settlement followed in the wake of subdivision and sale of the larger pastoral runs. Now wool is no longer "king" and meat contributes most to the income of the ordinary farmer, supplemented by wool and dairy produce. Artificial fertilisers and the advance of grassland farming have given a new impetus to farm production. In the development of most districts drainage has played an important part and now many large open drains serve as outlets for countless tile drains, acting in most cases in conjunction with mole drains.

Topography and Rainfall

In the east Southland County is divided from Clutha and Tuapeka Counties by a boundary which runs north from the coast at Long Beach to Waikaia; thence the Umbrella Mountains form a natural barrier, while to the north and west lie Vincent and Lake Counties.

The Mataura, with its source in the Eyre Mountains (which also extend into Lake County), is the main river of eastern Southland and its tributaries which divide the district are as follows:—

The Waikaia River, flowing between the Umbrella and Garvie

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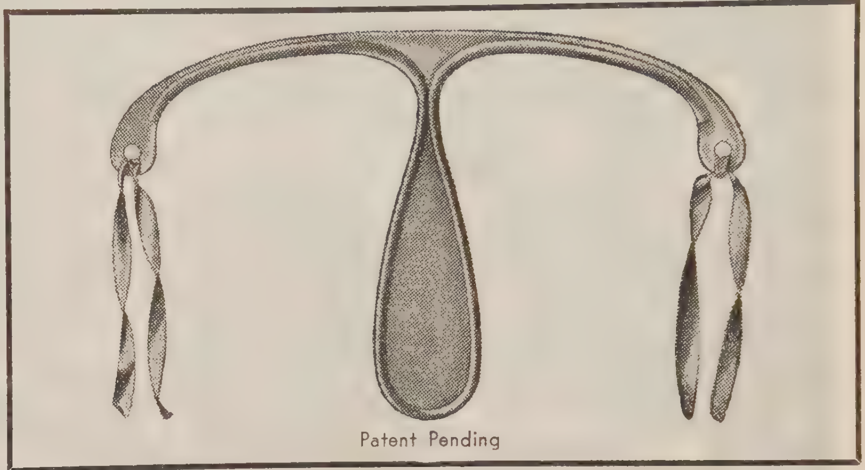

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ranges, joins the Mataura at Waipounamu on the eastern side of the extensive Waimea Plain.

The Waimea Stream, flowing parallel to the Hokonui Hills on the western side of the Waimea Plain, joins the Mataura at Mandeville.

The Waikaka Stream to the north-east joins the Mataura at Gore.

At Wyndham the Wyndham Stream joins the Mataura from the east.

The Waimahaka Stream, also from the east, joins the Mataura at Waimahaka.

The Hokonui Hills, which separate the Mataura and Oreti Rivers, run from Hedgehope north-north-west to Lumsden and conveniently divide Southland into eastern and western districts. This natural subdivision has a marked effect on trade; farmers in the eastern district make Gore their business centre, while those in the western district transact their business at Invercargill.

To the west and south of the Hokonui Hills the main topographical feature is the Southland Plain, about 25 miles by 40 miles, lying between the Oreti and Aparima Rivers and extending north from the coast to a line joining Wreys Bush and Fernhills. The boundary of Southland and Wallace Counties divides the plain from north to south.

The Oreti River, which rises to the west of the Eyre Mountains, flows south from Lumsden to Invercargill on the east side of the Southland Plain, while the Aparima River, which rises in the Takitimu Mountains, flows south from Otautau to Riverton, but on the west side of the plain.

Again to the west of Southland Plain is a natural barrier formed by the Longwood Range, which runs north to join the Takitimu Mountains. The main river is the Waiau, which, after draining the great lakes Te Anau, Manapouri, and Monowai, flows south to the coast at Tuatapere. Immediately to the west of Tuatapere lies the mountainous, heavily-bush-clad Fiord County.

The coastal portions of Southland have an average annual rainfall of 45 to 50in., which is distributed evenly through the year and is adequate for requirements. From a line joining Otautau and Mataura northward the rainfall decreases to 35in., and further north at Lumsden it is only about 30in. and the distribution is less even; that applies to the Waimea, Whakaea (Waikaia), and Five Rivers Plains.

Most of the ploughable land in Southland has been developed from tussock land. With drainage and topdressing, livestock production on this country has made great advances in the past 20 years.

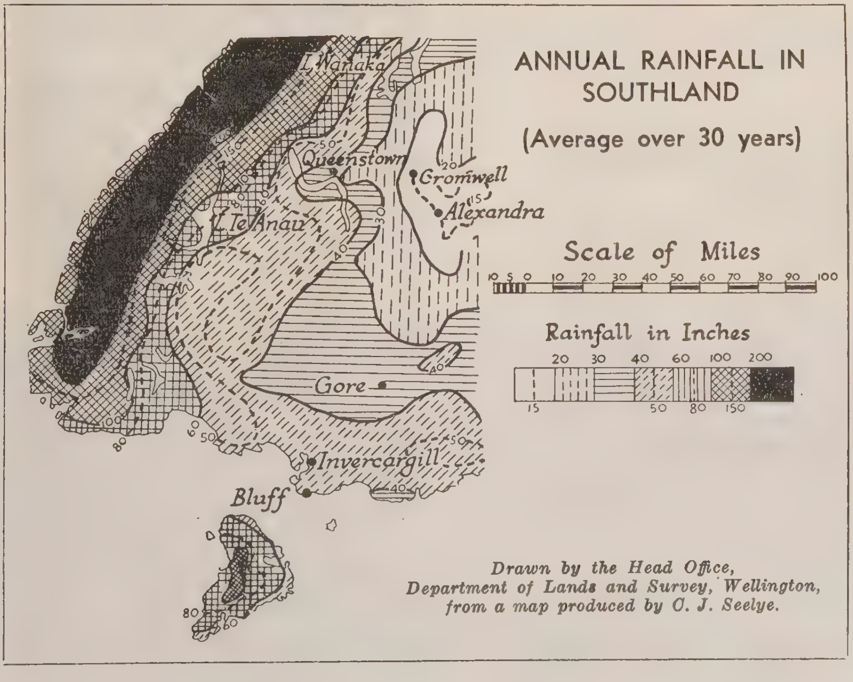
Soil Types

The soils of Southland in the main are river formed of a free-working medium silt loam overlying a silt clay subsoil. The topsoil generally is deficient in lime and phosphate and tends to dry out rapidly, though that is unusual in the coastal areas because the rainfall is evenly distributed.

The most extensive belt of more or less level country is the Southland Plain, which lies between the Oreti and the Aparima Rivers. This consists of a clay loam soil with a gravel subsoil, but is broken in places by undulating country derived from loess. The undulating country to the east of Invercargill, extending to Spur Head, is derived from loess.

The most fertile soils of Southland consist of recent alluvial silt deposits, and these are found at Mataura Island, which is on the east side of the Mataura River south of Wyndham, and in the West Plains-Wallacetown district to the north and west of Invercargill. The district of Otahuti and the southern part of the Drummond and the East Limehills-Boggyburn districts are also noted for their high fertility, as is the Edendale Plain, which is of river terrace formation and differs from most other parts of Southland in that it is naturally drained.

In general, fertility or potential fertility decreases from the coastal regions inland in the same way as does the rainfall.

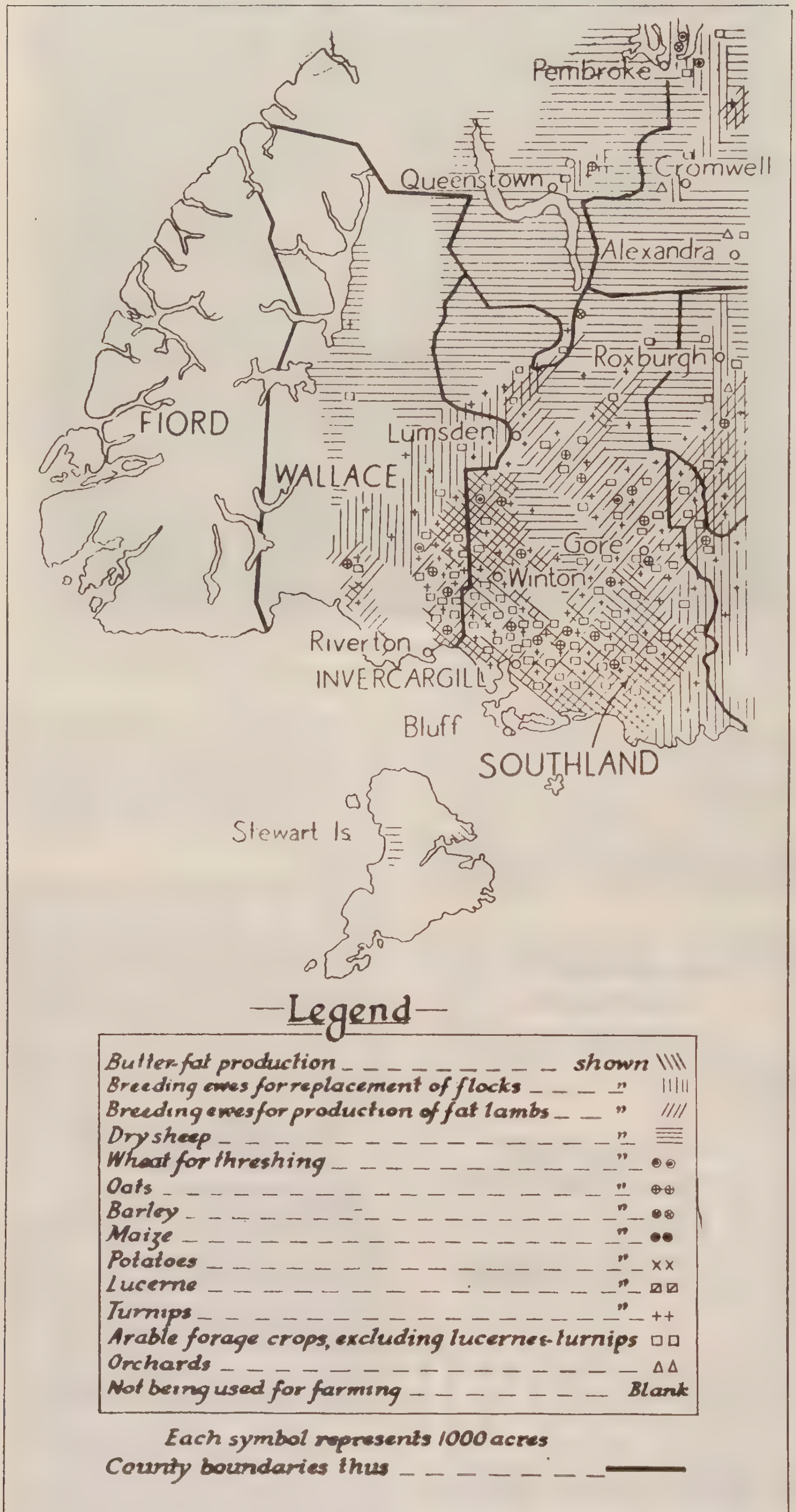


ANNUAL RAINFALL IN SOUTHLAND

(Average over 30 years)

Drawn by the Head Office, Department of Lands and Survey, Wellington, from a map produced by C. J. Seelye.

LAND UTILISATION IN SOUTHLAND


Pembroke
Cromwell
Queenstown
Alexandra
Roxburgh
FIORD
Lumsden
WALLACE
Gore
Winton
Riverton
INVERCARGILL
Bluff
SOUTHLAND
Stewart Is
—Legend—
Butter-fat production — shown \\\\
Breeding ewes for replacement of flocks — " ||||
Breeding ewes for production of fat lambs — " ////
Dry sheep — " ☰
Wheat for threshing — " ⊙⊙
Oats — " ⊕⊕
Barley — " ⊗⊗
Maize — " ●●
Potatoes — " xx
Lucerne — " ▨▨
Turnips — " ++
Arable forage crops, excluding lucerne & turnips □□
Orchards — ΔΔ
Not being used for farming — Blank
Each symbol represents 1000 acres
County boundaries thus —

[*Map drawn by the Head Office, Department of Lands and Survey, Wellington.*

Land Under Occupation

The Southland Land District, consisting of the counties of Southland, Wallace, Fiord, and Stewart Island, covers an area of 7,140,840 acres. Of these 4 counties only Southland and Wallace are of major agricultural importance; Fiord is virtually uninhabited and the occupied area on Stewart Island is less than 20,000 acres.

Of the total area in the land district during 1946-47 only 3,308,147 acres were occupied, comprising 5817 holdings, of an average size of 569 acres. Unimproved land in the occupied area totalled 1,908,157 acres, which was classified as follows:

	Acres.
Native grass and tussock ..	1,409,592
Fern and scrub	321,428
Flax (*Phormium tenax*) ..	6,717
Native bush	115,791
Barren land	54,629

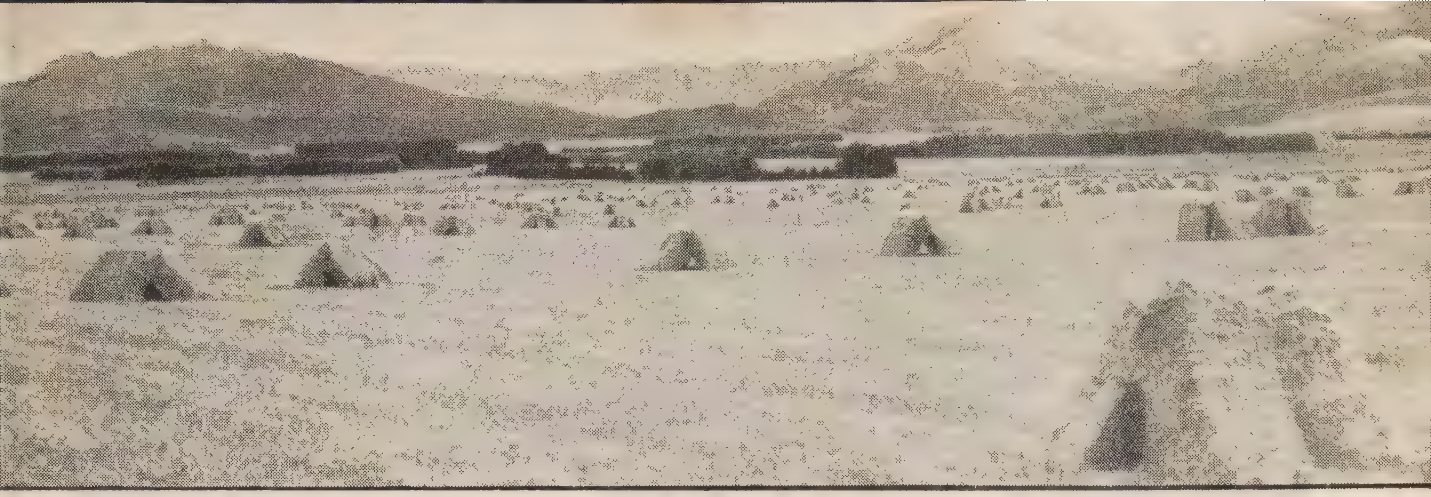
The remaining 1,399,990 acres of the occupied area is cultivated land, from which the main agricultural products—meat, wool, and dairy produce—are derived.

The Southland Plain, of about 600,000 acres, is the largest single block of cultivated land. The next largest block consists of the Waimea, Whakaea, and Five Rivers Plains, which together have an area of some 500,000 acres. Other fairly-extensive areas of cultivated land are the Edendale Plain, of 200,000 acres, and the West Plains-Wallacetown Plain, of about 100,000 acres.

On the Southland Plain south of a line joining Mataura and Winton, on the Edendale Plain, and on the West Plains-Wallacetown Plain the country is eminently suitable for dairying because of its fertility and the heavier and well-distributed rainfall of 45 to 50in. yearly. Nevertheless, fat lambs are produced to a very large extent and most dairy farmers also carry a ewe flock for that purpose. The Edendale Plain is the most intensive dairying district in Southland, probably because a large proportion of the area is naturally drained, being of river terrace formation.

The northern portion of the Southland Plain and the Waimea, Whakaea, and Five Rivers Plains are in a much lower-rainfall belt. The rainfall in these districts varies from 25 to 35in. yearly and is less evenly distributed through the year. Because of this factor and soils which are generally of lower fertility there is less dairy farming except in small favourable pockets. While fat lamb production is the principal industry, carrying capacity is much lower and farming is more mixed, greater reliance being placed on cropping and the production of grass and clover seeds.

Surrounding the plains mentioned is the foothill and in some cases mountainous country carrying native grass and tussock and comprising 1,409,592 acres. This large area for the most part produces wool and store stock and is known as pastoral run country. Most of this area lies inland to the north and north-east. Half-bred or crossbred sheep are used according to the altitude of the country, some of which ranges from 3000 to 5000ft. above sea level. The carrying capacity on the basis of sheep shorn varies between 3 and 5 acres per sheep, and the yield of wool averages 6 to 7lb.



Southland produces large quantities of hay for winter feed, and there, as in other parts of New Zealand, a large proportion is now baled.

On runs where sufficient flat land is available hoggets and 2-tooth ewes are wintered on turnips and hay. Ewes are culled for age in autumn, and these annual drafts are eagerly sought by the fat lamb farmer on the plains. On most of the runs beef cattle are carried, usually good-quality Hereford stock, which may be carried to the heavy beef stage or disposed of as 2-year-olds.

On the lower tussock country, more particularly to the south-east in the Otaraia district and the southern slopes of the Hokonui Hills, are smaller runs, more correctly classed as extensive fattening farms. On these farms the Romney ram is used almost exclusively, and though a certain percentage of lambs are sold fat, sufficient ewe lambs are retained for flock replacement.

Pasture and Crop Production

Of the total area cultivated of 1,399,990 acres, that in grasses, clovers, and lucerne is 1,253,741 acres, of which lucerne accounts for only 114 acres. This area of sown grassland is on the plains and the easier, rolling foothill country rising from them. The Southland Plain, Edendale Plain, and West Plains-Wallacetown Plain are capable of carrying first-class pastures of perennial ryegrass, cocksfoot, timothy, white clover, and red clover, alone or in combination. The Waimea, Whakaea, and Five Rivers Plains are of lower fertility, and on the Waimea and Five Rivers Plains particularly the production of chewings fescue, crested dogstail, and, in favourable years, white clover seed is of importance. On the foothill country surrounding Nightcaps, on the south-eastern slopes of the Hokonui Hills, and in the Otaraia district east of Gore browntop is the dominant grass, and in most seasons browntop seed is harvested. On the northern portion of the Southland Plain small seeds harvested include cocksfoot, ryegrass, crested dogstail, and red and white clover.

Grass and clover seed production is practically confined to the lighter-rainfall inland belt. Though seasonal conditions are reflected in the area closed for seed, with chewings fescue and browntop the area is more constant because for these seed crops a special farm management is demanded. The 47,695 acres closed for seed production in 1946-47 included the following:

	Acres.
Chewings fescue	16,362
Crested dogstail	7,315
Ryegrass	5,628
Cocksfoot	3,911
Browntop	*8,256
White clover	5,590
Red clover	3,237

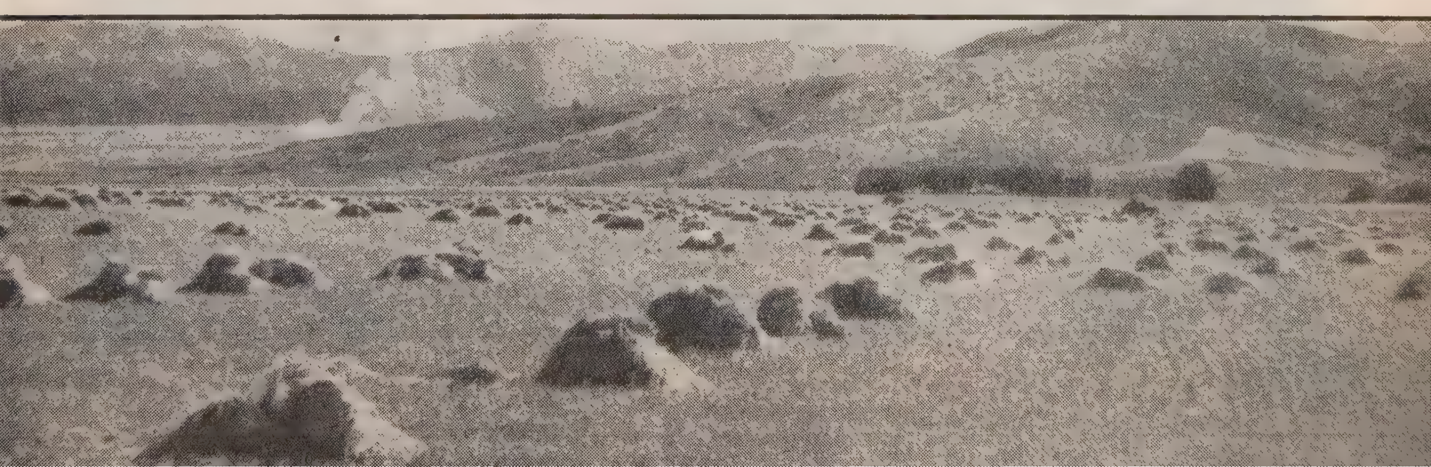
*Acreage entered for certification in 1947.

Pastures saved for hay and silage totalled 27,994 acres, and the greatest acreage is saved in the coastal districts where dairy production is more general.

The great majority of Southland soils are high in lime requirement, which no doubt is accentuated by the leaching caused by the high rainfall, particularly in the coastal area. Fortunately, deposits of limestone in accessible positions are numerous. In western Southland the main deposits are in easily-accessible low hills between Forest Hills and Fernhills, and deposits are being worked at Forest Hills, Browns, Lady Barkley, Limehills, Centre Bush, and Fernhills. Another deposit is being worked at Dipton West, and the works at Clifden serve a big area in the Tuatapere-Eastern Bush district. Eastern Southland is not as well served by local deposits as western Southland, but large supplies are drawn from South Otago in addition to those from Balfour and Waimumu. During the year ended August 31, 1948, Southland lime works produced more than 300,000 tons of lime. Grassland topdressed with artificial fertilisers during the year ended January 31, 1947, totalled 299,601 acres.

Liming has increased the carrying capacity of Southland in two ways: First, it has contributed to the breaking in of third-class land, as in the Woodlands-Morton Mains district at Dacre and Te Tipua; by adequate liming and topdressing the fertility has been raised to enable good strains of grasses and clovers to thrive, and this has occurred in many parts of Southland where the rainfall is adequate. Second, browntop swards in particular can be improved by topdressing with lime and phosphate. A change in the composition of the sward is gradually brought about, the browntop flourishing and becoming more palatable to stock, and this is accompanied by an ingress of other grasses, mainly Yorkshire fog, suckling clover, and later white

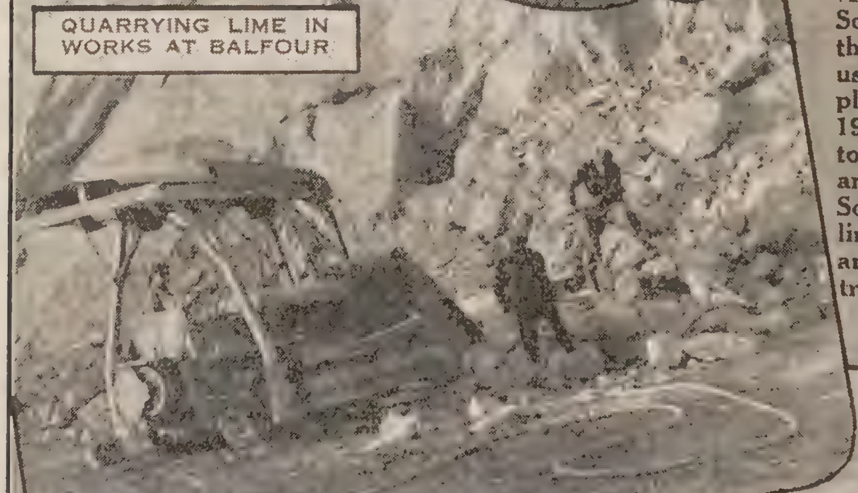
Though oats are not as important a crop as they were in the days of horse teams, Southland still grows considerable quantities, much of which is now used for milling.



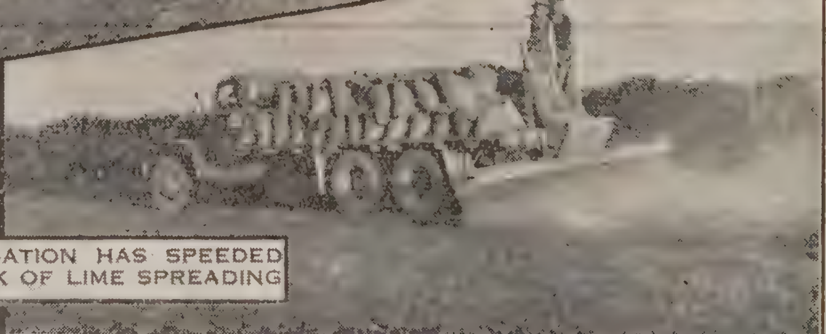
LIMING ON SOUTHLAND PASTURES

LIMEHILLS, ONE OF THE MANY LIMEWORKS IN THE PROVINCE

LIMING ENCOURAGES GOOD CLOVER AND HENCE GOOD PASTURE AND GOOD STOCK


QUARRYING LIME IN WORKS AT BALFOUR

An outstanding feature of Southland farming has been the widespread and expanding use of lime on practically all ploughable country. In the 1947-48 season about 350,000 tons of lime were produced and used in the province. Southland is well supplied with lime deposits, many of which are conveniently situated for transport by road and rail.


MECHANISATION HAS SPEEDED THE WORK OF LIME SPREADING

[*Photograph at upper left by V. O. Browne.*

clover. Ultimately a dominant browntop-white clover sward results, capable of fattening lambs, easily managed, and persisting indefinitely.

From crop production figures it is evident that the programme consists mainly of providing supplementary feed for stock during late autumn, winter, and early spring, when grass growth is scanty or dormant. The Southland farmer, being unable to rely completely on grass growth, is forced to grow root and green fodder crops for the period of low grass production.

The 138,419 acres of root and fodder crops grown in 1946-47 included the following:

	Acres.
Swedes	57,271
White-fleshed turnips	14,114
Yellow-fleshed turnips	16,779
Turnips and rape (mixed) ..	18,741
Rape	14,767
Kale and chou moellier ..	14,021

The total area of 43,794 acres in grain and cereals for threshing included the following:

	Acres.
Oats	14,168
Wheat	6,729
Barley	824
Peas	1,140
Linseed	926

Though some of the oats threshed may be fed to stock, an additional 15,155 acres of oats is grown for stock feeding, either as chaff or as greenfeed. The growing of oats for threshing in the main is confined to the Southland Plain in the vicinity of Drummond and the Waimea Plain in the vicinity of Riversdale. Wheat growing is confined mainly to the Dipton, Knapdale, and Waikaka districts. Barley and peas do exceptionally well in the Garston district, where excellent samples are produced in a normal season.

One noticeable feature in the cropping programme is the high percentage of pasture sown with nurse crops. In 1946-47, 53,076 acres were sown with crops, compared with 75,374 acres sown to grass alone. The nurse crops are in the main spring-sown cereal oats or wheat and lamb-feed crops of rape and turnips alone or in combination.

The only other crop of importance is potatoes, the area in which totalled 1016 acres. This acreage makes Southland self-supporting in table potatoes and permits sale of seed potatoes to northern provinces. The seed demand is mainly for the Arran Chief variety, and King Edward to a less extent; the demand for early varieties, which are in short supply, appears unlimited.

Farm Management

The sheep industry is the most important in Southland, and at April 30, 1947, breeding ewes totalled 2,267,607, from which 2,372,575 lambs had been tailed by January 31. Allowing for the number of ewes carried on the higher foothill and mountainous tussock country, it is evident that the lambing percentage on the 1,399,990 acres of cultivated land is very high. Sheep shorn in the Southland Land District represent 9.91 per cent. of the Dominion total and lambs tailed 12.73 per cent.

The following table gives the seasonal average of killings of sheep, lambs, and cattle at the 3 Southland freezing works for 4 10-season periods ended 1942 and the individual seasonal figures from that date:

		Sheep and lambs	Cattle
1903-12	..	334,360	200
1913-22	..	388,145	5,015
1923-32	..	596,114	3,847
1933-42	..	1,361,385	4,185
1942-43	..	1,598,465	7,641
1943-44	..	1,604,940	10,077
1944-45	..	1,661,267	7,412
1945-46	..	1,826,822	10,936
1946-47	..	1,926,793	9,294
1947-48	..	2,008,843	10,982
1948-49	..	2,112,379	8,249

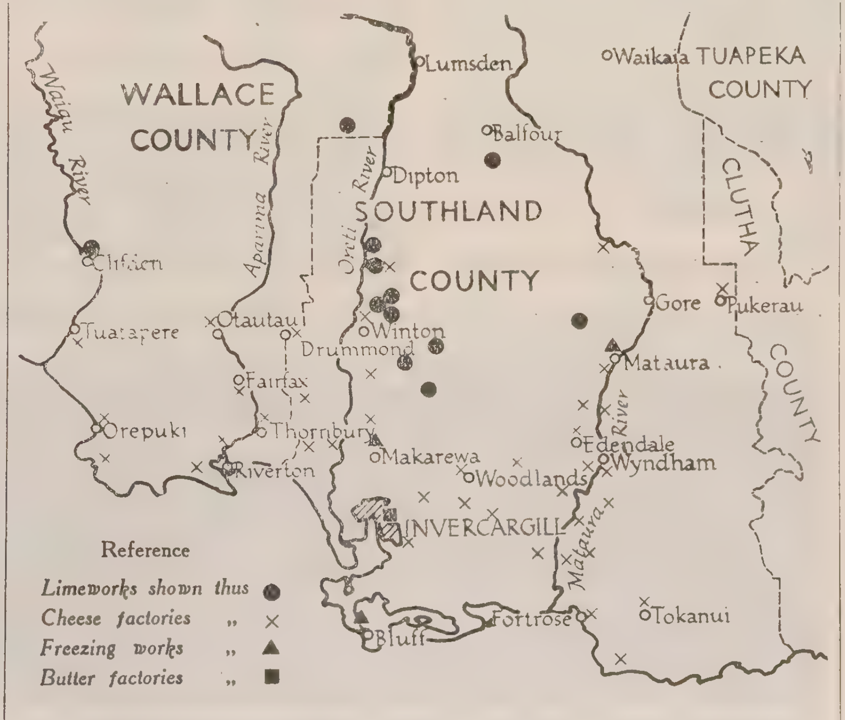
The numbers of sheep and lambs killed increased steadily during the period. The variation in the average killings of cattle can be accounted for largely by the rise and fall of dairy farming. With the boom in dairying at the end of the First World War fewer cattle were slaughtered. Again during the depression years killings of cattle decreased, corresponding with an increase in dairying, and it was not until after 1937 that killings of cattle increased to an appreciable extent. Killings of cattle during the 3 years ended March 31, 1936, numbered only 1898, whereas in the following 12 months killings of bobby calves reached the peak figure of 40,875.

The figures given in the table do not represent total killings, as figures for abattoirs are not included, and in addition many lambs, from eastern Southland in particular, are killed at freezing works further north. In the same way a large number of fat cattle find a market in Otago, particularly during winter and spring, when prices are most attractive.

One of the features of sheep farming in Southland is the extreme dominance of the Romney ewe, and probably in no other province is there greater uniformity in flocks. For the production of fat lambs the Southdown ram is used almost exclusively with the Romney ewe, and the steadily-increasing numbers of lambs killed for export each year illustrate the remarkable success attained by Southland farmers in this branch of the industry.

The proportion of sheep farmers depending on wool alone for revenue is extremely small. Though the area of unimproved occupied country totals 1,409,592 acres, the great bulk of this area is low foothills, generally including some flat land capable of growing feed for wintering hoggets and 2-tooth ewes. The sale of cast-for-age ewes at the annual autumn fairs has proved remunerative, as with the increasing price for fat lamb the fat lamb farmers on the better plain country are forced into competition to buy their ewe requirements. In some cases ewe hoggets or 2-tooth ewes are available for sale at this period, but these would represent produce of the lower foothill country.

The figure of 47,964 dairy cows in milk as at January 31, 1947, probably was the lowest for many years to come, as with the settlement of ex-servicemen dairying is being encouraged on the more suitable areas. Southland dairy farmers have concentrated on the manufacture of cheese and the province now has only one butter fac-



Map drawn by Head Office, Department of Lands and Survey, Wellington.

tory, at Invercargill. This factory receives cream by rail and lorry from the sheep farmer who also milks a small herd and from the dairy farmer whose farm is too far from a cheese factory to make the cartage of whole milk feasible. Cream is also received from numerous suppliers during winter, when cheese factories normally are closed during June, July, and August, though winter milking is not practised to a great extent.

The following table shows the extent of the cheese-making industry during the factory season 1944-45:

Output of Cheese (Tons)	Number of Factories
Less than 100	15
101-200	8
201-300	10
301-400	7
More than 400	4

The production from Grove Bush, Hedgehope, Mabel, and Tussock Creek factories has been excluded, as the supply of milk from these factories has now been diverted to the condensery at Underwood.

For cheese production the Friesian breed is most numerous, but most unexpectedly the Jersey breed is runner-up. This may be explained by the fact that milk is bought on the basis of butterfat and not of the casein test. The Shorthorn breed is next in order of popularity, closely followed by the Ayrshire.

The number of pigs as at January 31, 1947, 5761, does not correspond with the number of dairy cows milked. Though whey cannot be compared with skimmed-milk as a pig food, quite a lot of whey is wasted when it should be producing pig meat. A successful attempt to prevent this waste has been made at Edendale by the collection of whey for sugar-of-milk production.

Horses, of which Southland had 15,756 as at January 31, 1947, are a steadily-decreasing force. The tractor has progressively replaced the horse as motive power on the farm, and this replacement is continuing.

District Descriptions

Waikaka

The Waikaka Valley and surrounding districts are typical easy rolling sheep country, capable of carrying up to 3 ewes per acre. This example illustrates the increase in carrying capacity and the change-over from cropping. At the turn of the century a 400-acre farm was carrying 300 ewes and growing 70 to 80 acres of oats and a similar acreage of ryegrass for seed; now the same farm carries 1000 breeding ewes and 250 hoggets, and this stock is wintered on 20 acres of turnips supplemented by hay.

In the vicinity of Waikaka the valley was dredged for gold between 1896 and 1914, and though much damage occurred, as little topsoil was replaced, this damage has been remedied to a large extent by ploughing and regrassing. Dredging aided drainage and resulted in the reclamation of swampy areas created by the then tortuous course of the river; these areas were often subjected to severe flooding, which has now been corrected to a large extent.

Though wheat does not figure to a great extent in the cropping programme of eastern Southland, good crops have been produced on the area centred in Otama, the Otama Valley, and Wendon.

Garston

To the north-east, centred on the townships of Athol and Garston, is a pocket of good river flat forming part of the old flood plain of the Mataura River. This district is the only part of the province where barley of a sufficiently-high standard for malting can be produced. Of late years the barley acreage has declined and greater reliance has been placed on small seeds such as cocksfoot and white and red clover, with fat lamb production as the main feature of farming.

Waimea, Whakaea, and Five Rivers Plains

The Waimea Plain, centred on the township of Riversdale, runs from Mandeville in the south to Lumsden in the north. It was originally owned by an English syndicate, which carried out extensive oat cropping. The Whakaea (more popularly known as the Waikaia) Plain is really an extension of the Waimea Plain on the east side of the Mataura River, and the Five Rivers Plain is also an extension northward of Lumsden.

The soil, a shingly silt loam, tends to dry out in late summer, but nevertheless good crops of grass and clover seeds are produced. Most of the chewings fescue seed produced in New Zealand is grown on these plains, and extensive areas of crested dogstail also are harvested for seed. White clover seed is produced in quantity in favourable seasons.

Farming practice on these plains has changed considerably with the years, but now, with the increased use of lime and topdressing and better strains of grasses and clovers, fertility has been built up to a point where 2 to 2½ sheep per acre can be carried on many farms.

Mossburn

Some 30 miles to the north-east of Otautau and 60 miles north of Invercargill lies Mossburn, just inside the boundary of Wallace County where it joins Southland County. Though some of the flats are heavy, the main run of the country is light and is eminently suitable for the production of chewings fescue seed, which is a feature of the Five Rivers Plain to the east. Indeed, it was at Glenelg Station, Mossburn, that chewings fescue seed was first exploited. The sheep-carrying capacity on this fescue-producing class of land is 1 ewe to the acre, but seldom does more than a quarter of a farm produce fescue seed in any one season.

The tourist traffic to the Eglinton Valley and Milford Sound passes through Mossburn. From Te Anau north, and to the west of the lake, the country has been set aside as a national park, as is also the case with Fiord County.

To the north and west of Mossburn pastoral run country extends to the shores of Lakes Te Anau and Manapouri and is centred round the Takitimu Mountains.

Mataura Valley

The main dairying portions of eastern Southland are in the Mataura Valley between Gore and Mataura and southward again to Edendale. Good alluvial soil is present in the Mataura River valley and the adjoining low terraces. Practically all dairy farms carry in addition to dairy stock at least 1 ewe per acre, as farmers find old ewes are necessary for the con-

The Five Rivers Plain consists of a shingly silt loam and is well suited to the growing of chewings fescue seed. Almost the whole of New Zealand's crop of this seed is grown there.

[National Publicity Studios photo.

In a picturesque setting, Athol is situated in one of Southland's many glaciated inland valleys. Mixed-farming land in the valleys is bounded by high run country.

trol of ragwort. Only on dairy farms does this weed increase to any extent, and it can be considered a problem only to the dairy farmer.

Wyndham

Thirty miles inland from the coast, Wyndham is on the east bank of the Mataura River at the junction of the Wyndham and Mimihau Streams. It is connected by rail with Edendale on the main trunk railway and is chiefly a dairying centre. Good sheep country extends through Redan into the Mokoreta Valley and south to Glenham, Waimahaka, and Fortrose on the coast. Directly south of Wyndham lies Mataura Island, one of the most fertile areas in Southland.

Because of the possibility of flooding, this district, though eminently suitable for dairying, has specialised in the fattening of beef cattle. Meadow foxtail has been used in pastures by many farmers with excellent results for the production of early and palatable feed.

Edendale Plain

Edendale township is 23 miles east of Invercargill, and an extensive plain consisting of alluvial terraces formed by the Mataura River on its west bank runs from Brydone in the north to Mataura Island in the south. The land is first class for dairying, and it is drained naturally by its gravel subsoil, which is generally 6 to 8ft. below the surface.

A large cheese factory dates back to the one first erected in 1882, and this factory and the four neighbouring factories at Wyndham, Menzies Ferry, Seaward Downs, and Brydone are known locally as the "big five." Edendale also has a sugar-of-milk and whey-paste factory, whey being collected in special tank wagons from neighbouring factories as far distant as Kennington.

Woodlands-Morton Mains

Eastward between Invercargill and Edendale lies a large tract of flat and undulating country centred on Woodlands. Dairying is carried out on the better flats, and cheese factories are numerous. On the down country sheep farming is general, and with the use of cobalt in topdressing mixtures excellent drafts of fat lambs are obtained.

Greater improvements in the development of farmlands have been made in this district during the past 15 years than in any other part of Southland, the pioneering efforts of the late Sir William Hunt and of the Southland Frozen Meat Company at Te Tipua deserving special recognition.

This developmental work was most spectacular, as it was carried on on a large scale, and it resulted in third-class and abandoned land being brought into first-class pasture swards capable of carrying 4 to 5 ewes per acre. This was accomplished by fallowing for one season, the growing of a swede crop, and the subsequent sowing down of a Certified grass seeds mixture, generally with oats or lamb feed, in the following spring. A heavy initial application of 2 tons of carbonate of lime was made some 2 months before the ridging of the swede crop, followed by a further 1 ton before the land was sown out to grass.

To maintain the pasture sward annual applications of 1½ to 2cwt. of superphosphate per acre are favoured, with 10cwt. per acre of carbonate of lime in addition every second year.

West Plains and Wallacetown Plain

Lying just north of Invercargill, the West Plains and Wallacetown Plain contain some very fertile soil, suitable for dairying and fat lamb production. The soil is exceptionally deep at Wallacetown—in places up to 3ft. A condensed-milk factory at Underwood draws milk from as far afield as Hedgehope, Mabel, Grove Bush, and Tussock Creek, in addition to that obtained from nearby farmers. The largest frozen meat works in Southland are at Makarewa. Lorneville is the principal Southland fat stock market, where weekly sales are held.

Winton

The township of Winton, on the Southland Plain 20 miles north of Invercargill, is the centre of a rich farming district where both fat lamb production and dairying are carried on. Winton is noted for its sheep market, and from March onward crossbred Romney breeding ewes from the store country on the foothills find a ready demand from the fat lamb producer on the plain.

At Centre Bush and South Hillend cropping is more extensive, combined with general sheep farming. In these districts great quantities of oats were produced for export to Australia before the introduction of refrigeration in 1882, corresponding with the early practice on the Waimea Plain.

The bulk of the timothy seed is produced in the district around Limehills and Boggyburn, and extending to Kauana. On one field 20 successive seed crops were produced. The soil is heavy and retentive of soil moisture, and yields of 300lb. per acre are usual.

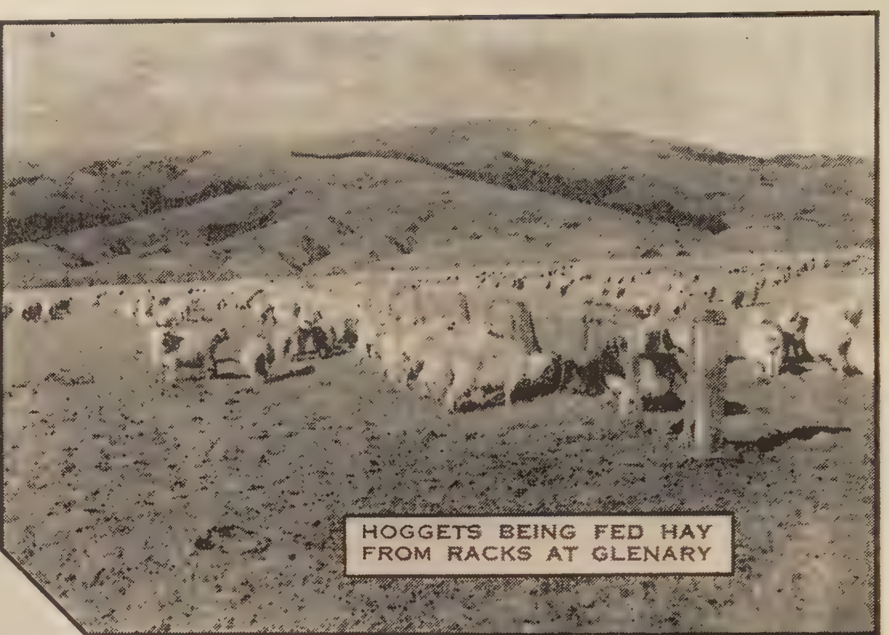
Most of the Southland lime supply is produced in the Winton district.

Dipton

Twenty miles to the north of Winton, the Dipton district is really an extension of the Southland Plain, following the Oreti River north from Fernhills. Here the annual rainfall is some 20in. lighter than on the coast, and occasionally a short drought may be experienced. The carrying capacity is about 2 sheep per acre, compared with 4 to 5 ewes per acre wintered on the better fat lamb farms in the higher-rainfall belt to the south.

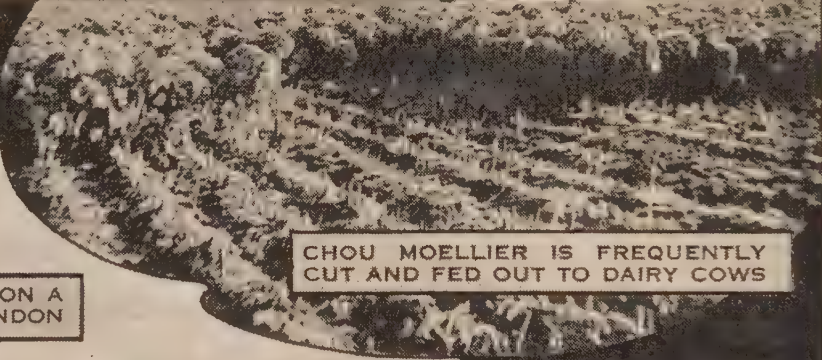
A consistent acreage of wheat is grown in the Dipton district, the bulk of it attaining milling standard. The growing of wheat for milling is not recommended south of a line joining Wairio, Winton, and Mataura because of the difficulty of attaining the required low moisture content in the grain. The percentage normally required is 15.5, but a tolerance of 1 per cent. is allowed by millers for wheat

WINTER FEEDING OF STOCK IN SOUTHLAND



HOGGETS BEING FED HAY FROM RACKS AT GLENARY

MIDWINTER AT MANGAPIRI



CHOU MOELLIER IS FREQUENTLY CUT AND FED OUT TO DAIRY COWS

EWES AND CATTLE FEEDING ON A BREAK OF TURNIPS AT WENDON

The provision of winter feed for livestock is of major importance in the cold winter conditions experienced in Southland. Swedes, turnips, chou moellier, and hay are fed to both sheep and cattle.

Though development has not been as rapid as elsewhere, on some of the coastal areas such as near Tuatapere bush is slowly giving way to grassland.

produced in Southland. The average yield of wheat for Southland as a whole varies between 40 and 45 bushels per acre, but the Dipton crop averages more than 50 bushels. Header harvesting of the crop is increasing, but in the less favoured districts the older method of cutting with a binder, stooking, stacking, and threshing in spring is ideal if milling quality is desired.

Drummond

Midway between Winton and Otautau, about the centre of the Southland Plain and on the border of Southland and Wallace Counties, is the prosperous mixed farming district of Drummond. To the south the soil and pasture are first class, but fertility falls off to the north in the Heddon Bush district.

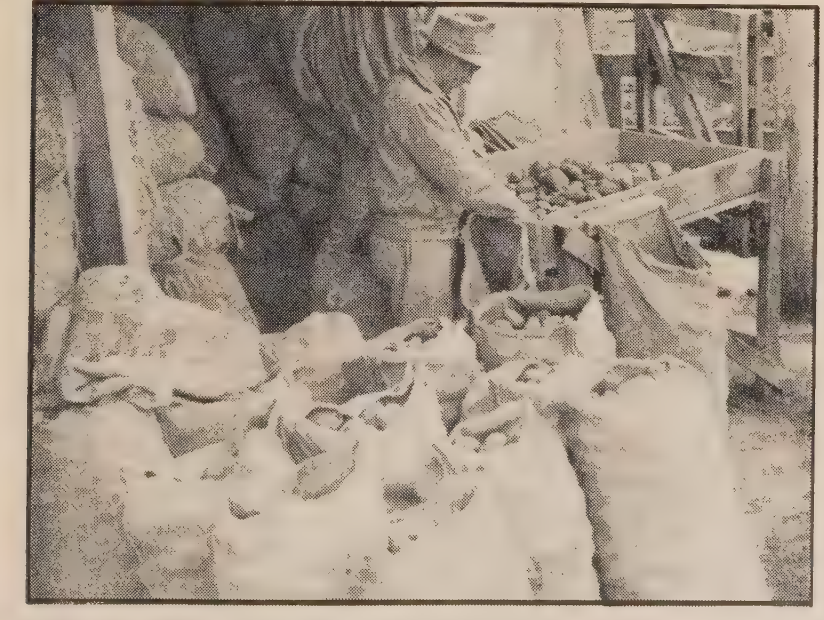
In the vicinity of Drummond excellent crops of oats are obtained, and a yield of less than 100 bushels per acre is regarded by farmers as a light crop. It was in this district, at Bayswater, that 112 bushels of wheat per acre—a yield considered by the late Dr. Hilgendorf to be a world record—was produced some years ago.

To the north sheep farms become more extensive, as the soil is lighter and the gravel subsoil closer to the surface, and these farms offer scope for further development.

Otautau

Also on the Southland Plain, the township of Otautau is on the banks of the Aparima River some 17 miles north from coastal Riverton. Extending up the river to the north is the fertile Strathvale settlement, devoted mainly to dairying. Further to the north and east lies the good sheep country of Wreys Bush, Nightcaps, Wairio, and Scotts Gap. The Scotts Gap area is also noted for its production of small seeds, mainly white clover and, to a less extent, crested dogstail. White clover seed production is favoured because the herbage growth is not quite as prolific as on the wetter coastal areas, and as a consequence harvesting conditions are better.

Across the river to the west lie the Ringway ridges and Isla Bank, both areas being excellent down country for fat lamb production. To the south is Fairfax, suitable for dairying, and westward in the foothills of the Longwood Range sheep farming is practised. Further to the south Thornbury is a good farming district suitable for dairying and fat lamb production, and on the coast at the mouth of the Aparima is Riverton, the oldest settlement in Southland.



The Tuatapere district is well known for the high quality of the seed potatoes grown there.

Tuatapere

On the banks of the Waiau River and some 6 miles from its mouth, Tuatapere is about 20 miles north-west of Riverton, the road and railway following the coast. To the west of Riverton the country is hilly and highly mineralised, and only small areas have been developed toward Orepuki, the road winding through native bush in places. At Round Hill much gold was obtained by sluicing in the early days, and as many as 500 Chinese were employed there before gold sluicing was begun in Central Otago. One company still operates near the beach and is responsible for most of Southland's present gold production.

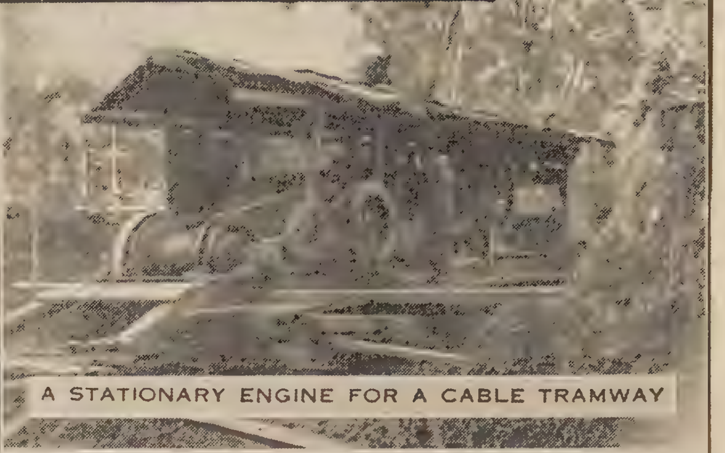
From Orepuki to Tuatapere is a narrow strip of fertile flat land suitable for dairying and fat lamb production, and the Papatotara district, on the west bank of the Waiau River, is similar.

At Te Wae Wae and Papatotara the potato crop is an important sideline for most farmers, as these districts are eminently suited for the production of virus-free potato seed because of their isolation to the east by the Longwood Range, to the west by the uninhabited Fiord County, and to the south by the Antarctic Ocean, whence comes the prevailing wind. This isolation prevents the entry and spread of aphis, which transmits the virus diseases. All the lines of Arran Chief potatoes at present in certification are derived from a line found in this district. Many Canterbury growers place standing orders with Southland producers of seed potatoes.

The potato crop has played an important part in the breaking in of this land from virgin bush. After the

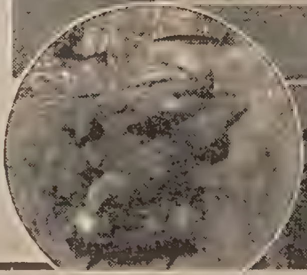
THE TIMBER INDUSTRY OF SOUTHLAND

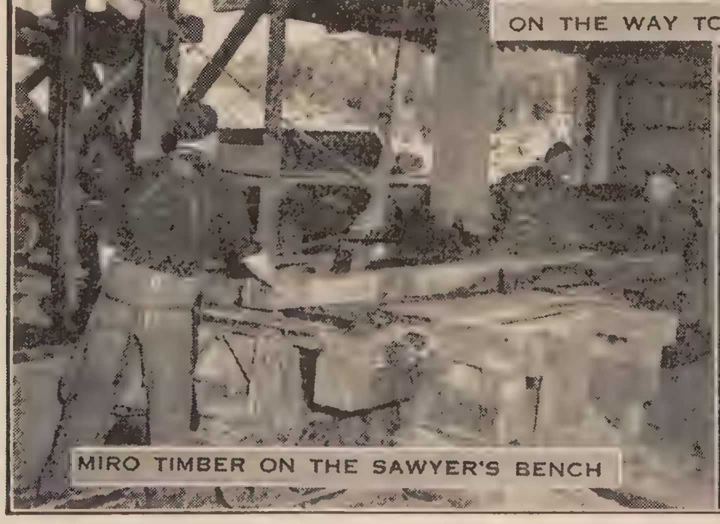
A BUSH TRAMWAY AND ENGINE HOUSE


A STATIONARY ENGINE FOR A CABLE TRAMWAY

SOUTHLAND BEECH ON DRYING RACKS

The timber industry of Southland is bound up with the growth of the province and the development of its agriculture. Most of the coastal timber has now been cut, and the plantations of exotic timbers are just coming into bearing. Though no accurate figures of the resources of indigenous timber can be given, there are reasonable prospects of a good milling life in the Tuatapere district (where these photographs were taken), which will remain the main milling centre of the province.


ON THE WAY TO THE MILL


MIRO TIMBER ON THE SAWYER'S BENCH

A MIRO LOG BEING BROKEN DOWN

area had been cut over by the timber mills the remaining bush was felled and burnt and the area surface sown to grass, cocksfoot generally dominating in the seeds mixture because it does exceptionally well in this district. Logging-up and stumping would follow later, and the area would be ploughed in autumn or early winter for the first crop of potatoes, which give an early and profitable return for the labour involved in breaking in the land.

Just before the outbreak of war a demonstration of clearing land of stumps, logs, and light standing bush with bulldozers was given at Papatotara by the Public Works Department. Unfortunately, this work was reduced because of war conditions, but it has now been restarted and since 1940 a total of more than 12,000 acres has been cleared by heavy machinery.

A lime works is situated at Clifden, on the Waiau River some 8 miles north of Tuatapere, and much lime is delivered by lorry, as the works is about 7 miles from the rail head at Orawia.

Eastern Bush is north of Clifden, and this is a very favourable sheep farming district. Some very fertile valleys around Pukemaori and Orawia extend through Birchwood to Ohai.

Most of Southland's good household coal is obtained at Ohai and Nightcaps. The surrounding district is good sheep country, with pastoral run country extending to the north.

Exports Through Bluff

Bluff, the port of Southland, probably ranks next in importance to the four main harbours of the Dominion. The first vessel to trade to Bluff was a cutter of about 40 tons called the Schnapper, which arrived in 1822. Sheep were landed at Bluff in 1855, but not until January, 1856, was Bluff harbour declared a port.

The table at the foot of this page shows exports from Bluff at 5-yearly intervals from 1900 to 1945 and the figures for 1948.

The Timber Industry

The story of Southland's sawmilling industry is bound up with the story of the growth of the province, the coastal area of which, apart from the somewhat extensive bush-covered swamps, is in the 35 to 50in. rainfall belt. Even Stewart Island, now regarded as a sanctuary for all that is native, once rang to the blow of the axe and the scream of the saw.

Sixty years ago timber was being taken out of the Waikawa area, which includes Niagara, Blackhorn, Tokanui, and Progress Valley. The price was then 4s. 6d. per 100ft. of sawn timber, compared with nothing less than £1 today.

With changed methods of pasture management, Southland can now send more than 2,000,000 fat sheep a year to the freezing works—about four times the figure of 20 years ago.

Forty years ago one of the largest sawmills in New Zealand operated at Woodend, and it cut timber from Bluff Road to Kapuka. It has been stated that 25,000ft. of timber could then be cut from 1 acre of land in this district; half that amount is cut now.

About that time Tuatapere became the biggest sawmill centre in Southland, and trees have continued to crash in the Te Tua, Alton, Grove Burn, Happy Valley, and Pukemaori districts. With rapid and continued improvement of transport and milling methods the potentialities of the forests in this district are difficult to assess, but there are still many millions of feet of timber in what can be classed now as accessible areas.

Including a small number of mills which confine their cutting to plantations of *Pinus radiata, Cupressus macrocarpa*, and similar species, 27 mills are operating in Southland, and of these only three companies were in operation at the beginning of the century, when mills were much more numerous. Most of the mills are in the Tuatapere district, though the sites are now many miles from the township instead of being close by as they were 40 years ago. Mills work at Grove Burn and Rowallan to the south-west, Alton and Lillburn to the north-west, and Happy Valley to the south-east on the Longwood Range. On the east side of the Longwood Range one mill works from Otautau and four others north from Longwood. Two mills work in the Hokonui Hills, from Otapiri Gorge and Hedgehope respectively. To the south-east of the province seven mills are working from Te Peka, Tokanui, Haldane, and Niagara.

The number of hands employed in these mills considerably exceeds 500, a figure which has been maintained for the past 40 years. None of the indigenous bushlands of Southland has been replanted, but in many areas regeneration of the beech has been fairly rapid, especially when protected from fire and other damage.

Coal Production

Southland industry owes much to its coalfields, which are mainly in the Ohai-Nightcaps area. Large deposits remain to be exploited, and much coal can be obtained by open-cast methods. A shale deposit at Orepuki was worked at the beginning of the century, but because of technical difficulties work on this project lapsed, though since then coal has been obtained from the area spasmodically.

Lignite occurs in many districts in Southland, and deposits have been, and still are being, worked. The largest deposit is at Mataura, and this may be exploited more extensively in future if certain difficulties can be overcome to enable briquetting to become an economic proposition.

Fibre Production

The production of *Phormium tenax* fibre has always been a feature of

EXPORTS THROUGH THE PORT OF BLUFF

Year	Meat (tons)	Wool Bales	Cheese (tons)	Grain (tons)	Timber (super. ft.)
1900	7,542	25,597	1,460	37,586	51,000
1905	5,323	23,079	1,742	33,914	223,000
1910	11,020	35,878	5,161	32,862	278,260
1915	14,294	35,777	7,210	37,723	313,867
1920	18,533	42,285	7,280	7,637	554,882
1925	9,684	31,735	9,101	5,691	909,670
1930	15,110	36,624	13,777	9,412	2,936,185
1935	24,420	47,008	13,288	9,056	3,755,500
1940	29,510	78,195	13,642	7,171	3,209,958
1945	29,097	24,630*	10,219	2,767	2,773,920
1948	38,082	105,695	9,090	—	1,204,020

* Because of wartime conditions wool stocks were allowed to accumulate in New Zealand.

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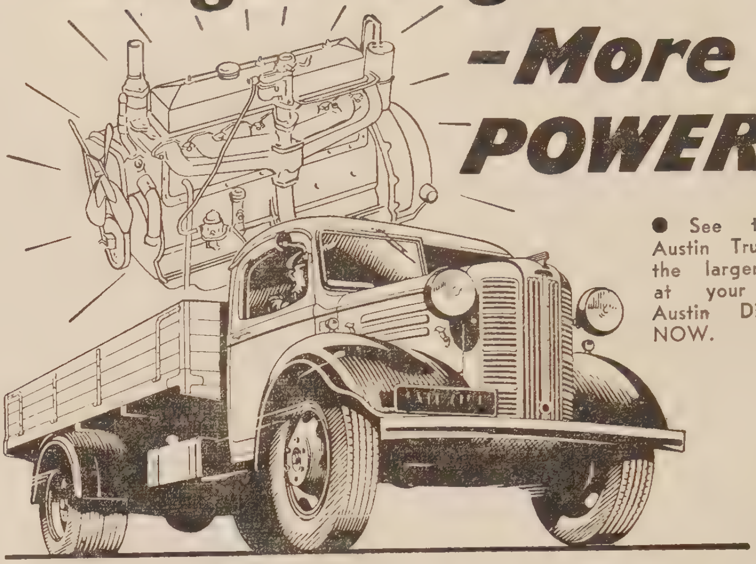

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3088.9 ANOTHER DUNLOP PRODUCT

Southland industry, and in the early part of the century strippers were located in many parts of the area from Caroline in the north to Tokanui in the east, at Tuatapere in the west, and even on Stewart Island. Now five mills operate at Riverton, Winton, Otatara, Gorge Road, and Redan. Most of these mills rely on natural areas of flax, but in many cases these areas have been extended by plantings, notably at Redan. During the war the cutting of distant or uneconomic areas was encouraged by a subsidy ranging up to £1 per ton on green flax.

At this period, too, linen flax fibre production was encouraged, and factories for processing it were erected at Winton and Otautau and later at Woodlands and Gore. The Winton factory is still operating, but now 600 acres is sufficient to keep it in production, in contrast to 4500 acres needed for the four factories during the war.

The paper mill at Mataura, as well as using wood pulp, is also capable of dealing with supplies of linen flax straw and *Phormium tenax* fibre in larger quantities than are available at present.

Other Industries

An oat mill at Gore specialises in the production of breakfast foods and biscuits. The trade prefers for milling a white oat with a plump grain and a low percentage of husk to kernel. Contracts for such areas of oats are arranged with farmers by the mercantile firms operating from Invercargill and Gore for western and eastern Southland respectively. In addition to the oat mill at Gore the same company operates a flour mill at Invercargill, and this mill handles most of the milling wheat produced in Southland. Surplus milling wheat and any fowl wheat produced are disposed of to northern buyers.

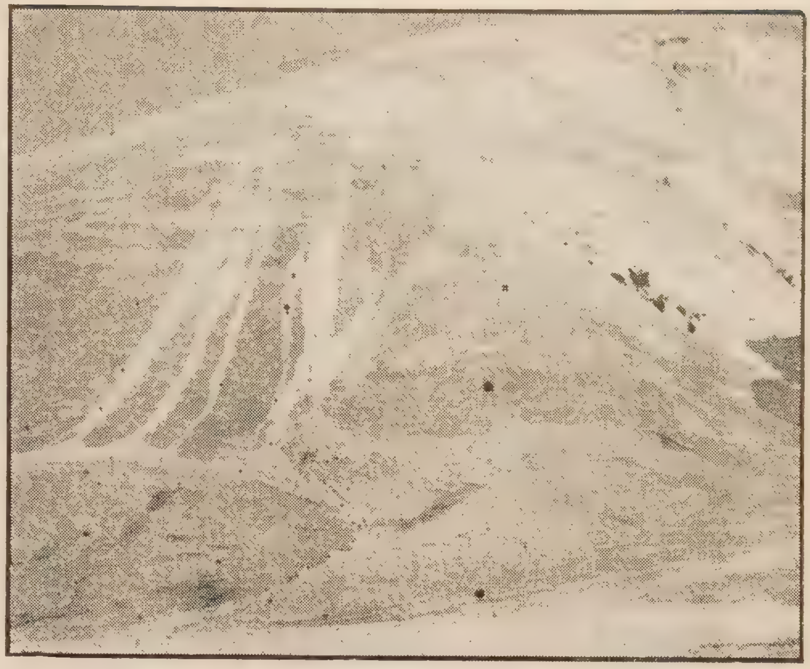
The only woollen mill in Southland is at Rosedale, Invercargill.

Other examples of industrial activity allied to farming are the brick and tile works, two of which are at Waikiwi and one at Browns. These supply the innumerable tiles required for drainage. One farmer has estimated that he has laid 300,000 tiles on his 375-acre farm, apart from others laid by his father before him.

Of late years a demand has arisen for concrete products, particularly posts, and also tiles and pipes for culverts, and as a result one company has numerous branches scattered over Southland engaged in this work. Until recently one of the factors limiting production has been the scarcity of reinforcing material needed.

Summary of Development

In the period of less than 100 years since land for settlement was first taken up vast progress has been made in Southland. Extensive grazing and reliance on wool alone in the first place were followed by large-scale growing of oats, mainly for export to Australia, combined with wool production. After the introduction of refrigeration in 1882 farming became more diversified with the export of meat, butter, and cheese. This period was also associated with the start of subdivision of the larger estates. About this time the liming of land was begun and its development was accompanied by phenomenal results in the way of increased carrying capacity and greater persistence of the better-class pasture swards.



On the low-rainfall inland areas of tussock country in Southland erosion of various types is causing concern to runholders.

This increased carrying capacity resulted in a decline of the oat acreage, but was accompanied by an increase in the acreage of fattening and winter-feed crops grown. A further decline in the oat acreage has resulted from the adoption of the tractor as motive power on farms to replace horses, for the feeding of which a large acreage of oats was grown.

While these changes were occurring more and more land was being developed by draining, liming, and resowing to improved strains of grasses and clovers to which were applied annual dressings of artificial fertilisers. Thus the carrying capacity and production have been built up to their present high figures.

Outlook for Future

Agricultural production in Southland, as in most other provinces of New Zealand, will depend on future world markets for primary produce, but if the aims of the Food and Agriculture Organization of the United Nations are fulfilled, the production of meat, wool, dairy products, and small seeds should offer a rosy future for Southland farmers.

Until recently supplies of phosphatic fertilisers were rationed, but with the end of rationing the figure of 350,988 acres of grassland now being topdressed annually with lime, phosphates, or both may be doubled or even trebled. It is estimated that three-quarters of occupied Southland would well repay the expense of topdressing.

Though drainage has played an important part in the development of Southland, and the work of farm drainage was implemented by the passing of the Southland Land Drainage Act, large areas of land await dragline excavations for this purpose, as is evidenced by the fact that the Southland Catchment Board has been inundated by requests from farmers since its formation in 1945. Work of this nature affecting two or more farms carries a subsidy when approved by the board's engineer, and such work must result in greatly-increased carrying capacity.

Southland has vast potentialities for the production of water power. In the past only one major scheme has been developed—the harnessing of the Monowai, a tributary of the Waiau River, which drains in addition to Lake Monowai the larger Lake Te Anau and Lake Manapouri—but opportunity for expansion is ample. A survey of the Wairaurahiri River, which drains Lake Hauroko in Fiord County, has shown that the fall from the lake outlet to the coast is phenomenal.

Acknowledgment

Statistical figures quoted are from Statistical Report on the Agricultural and Pastoral Production of New Zealand for the season 1946-47 except where otherwise stated.

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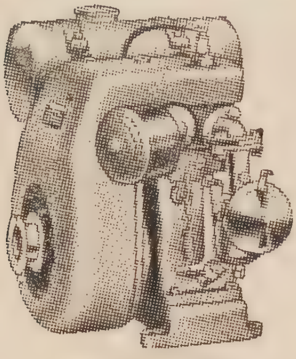

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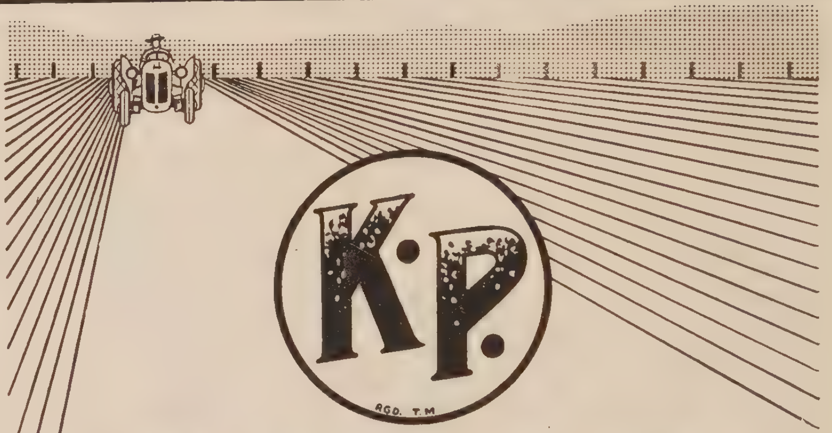

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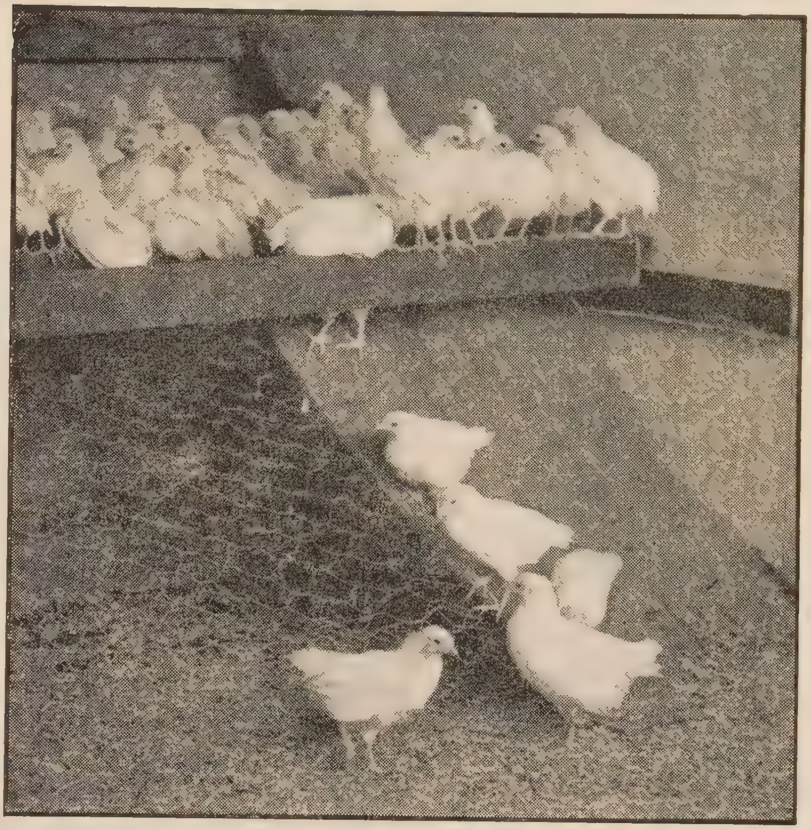
Household Poultry: Brooding and Rearing Chicks—Broody Hens and Artificial Brooders—Teaching Pullets to Roost

THOUGH in general backyard poultry keepers are better advised to buy stock at the perching pullet stage, some have suitable facilities and the inclination for rearing day-old chickens, in which case useful experience and even pleasure in successful achievement can be obtained by rearing the replacement stock. Provided no undue setback occurs in the rearing, the cost of the reared pullets will be less than that of buying perching pullets. Sideline poultry keepers, if they want to keep costs to a minimum and profits to a maximum, must rear their own stock. Advice on the subject is given in this month's article for the household poultry keeper by W. L. McIver, Poultry Instructor, Department of Agriculture, Dunedin.



[*Green and Hahn Ltd. photo.*

A netting ramp from the floor to the front of the training perches enables pullets to be driven up to learn to roost.

THE tendency in most businesses is now toward specialisation. Though any farmer must to some extent be a "Jack of all trades," the poultry farmer has to take many factors into account to attain efficiency in his business. First, he must decide whether to make his main objective egg production or sales of stock—day-old chicks or perching pullets. Then he has to plan his layout to obtain the best results from the least labour and the smallest capital expenditure. Just as the commercial poultry farmer must operate at a profit, so the household poultry keeper should aim to do the same. Too many backyarders say they keep a few hens merely to provide enough eggs for the family and admit they do not care what the eggs cost. Records should be kept of egg values and costs. If the value of the eggs, computed at retail prices, is not twice the feeding outlay, there is something wrong and it has to be ascertained whether the fault lies with the stock or management. Certainly the owner should be most considerate for the welfare of his hens, even to the extent of kindness, but culling out or killing ailing or poorly-producing birds cannot be taken to indicate lack of kindness. Killing by dislocation of the neck is quick and painless; permitting a hen to die slowly of some painful complaint is cruel.

Hatching or Buying Chicks

As a commercial farm becomes larger it is found necessary to specialise in one branch or the other, so that economy in labour finally decrees that the hatchery side of the business should be separated from the egg production. The householder might argue that his case is different and that his poultry keeping is performed in spare time worth nothing, but that is only begging the issue that the working cost factor is essentially made up of feeding, housing, and replacement costs plus labour. If it is proper that the commercial farmer should take all these factors into account, it is right that the householder should do the same. Consequently, even if a householder desires to rear the chickens from the day-old stage, probably he will find it better in the long run to buy the chicks rather than attend to his own hatching.

This should not be taken to mean that sideline poultry keepers are not recommended to run their own breeding pens and produce their own hatching eggs. There is a wide distinction between breeding and hatching, and whenever conveniently possible the sideliner should breed his own replacement stock.

One of the obvious disadvantages of buying chickens is the uncertainty of obtaining high-quality, well-bred, disease-free, strong, healthy stock. An owner who runs his own breeding pen knows his stock and has entire control over the selection of breeders. Any birds he does not like are culled out. In preference to attending to his own incubation, he should send the eggs out to be custom hatched by an experienced professional. No backyarders and few sideliners have flocks large enough to warrant running their own breeding programmes, but sideliners who have sufficiently-large flocks should do so for the satisfaction of knowing the pedigree.

Some backyarders set a few of their own hens' eggs under a broody hen, but that has obvious disadvantages—first, the uneconomic cost of feeding the cockerel, and, second, the lack of separate pens, which entails mating up all the hens instead of only selected ones.

However, for an owner who has the time and inclination a great deal of interesting pleasure can be obtained from rearing chickens from the day-old stage. If this effort is ill fated, buying perching pullets late in the season to take the place of the pullets that died may be difficult, but with average mortality rates a man who is prepared to take the risk can cut down the cost of replacement stock.

Broody Hens

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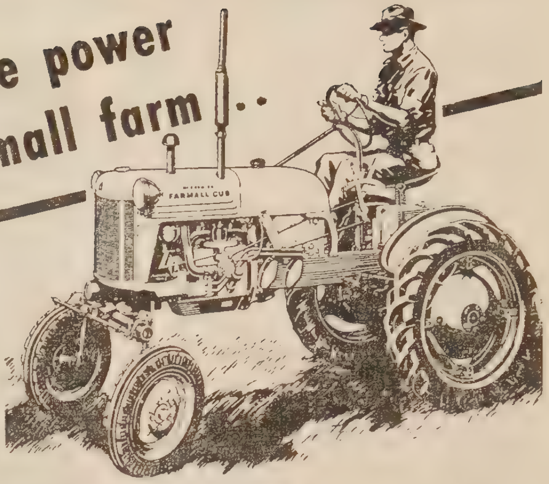

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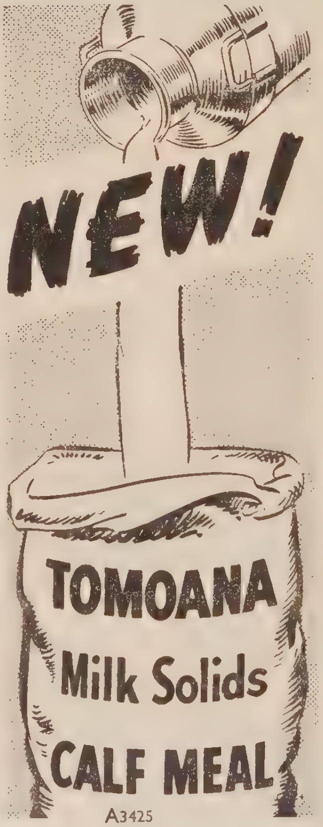

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houses for rearing pullets once they are away from the heat, but these subjects are covered in the Department of Agriculture's Bulletin No. 199, "Chick Raising," obtainable for 6d. from its major offices.

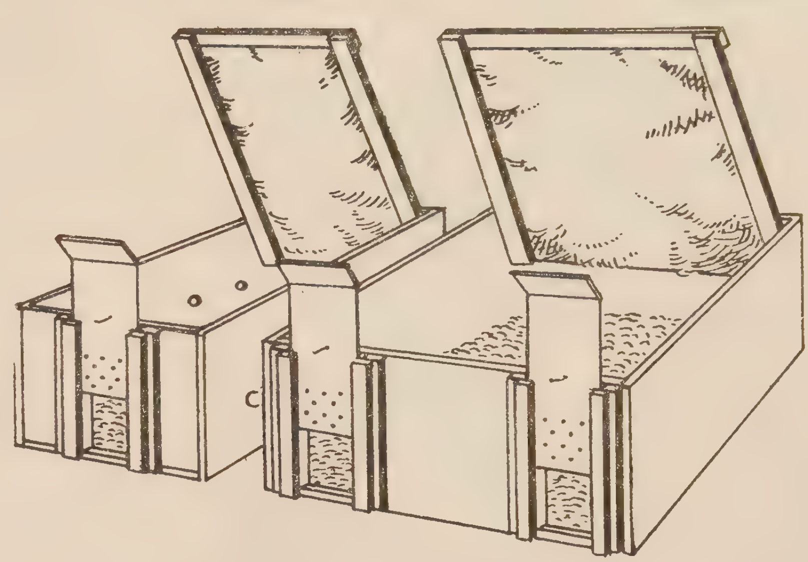
The easiest way for the householder to rear chicks is to take advantage of the fact that the broody hen usually performs an efficient job of mothering. Though Nature has adapted the hen to care for the chicks and the chickens to heed the broody hen, the process is not quite so simple that she does not need some assistance from Man.

In view of the ever-present danger of contagious diseases and parasites being passed on from the mother hen to the chick, it is essential to employ for brooding only hens considered to be healthy. Before the chicks are given to her she should be dewormed and deloused. If she has scaly leg disease (caused by a mite), she should be treated for that trouble. Light-breed fowls seldom get scaly leg; if they do, it is almost invariably because they have been reared under a heavy-breed mother or housed for a long period with heavy-breed flock mates. The mother hen's internal and external parasites are certain to be passed on to the chicks, so prevention is the wise course.

The best way to deworm backyard hens is by nicotine sulphate or carbon tetrachloride given in pill form. These can be made by a chemist. Lice can be controlled readily by applying a few drops of nicotine sulphate directly to the skin of the birds. Put 3 drops on the abdomen below the vent and 1 drop under each wing, on each side of the breast, and behind the head. This does not kill the lice eggs, so if such eggs are seen at the bases of the feathers on the abdomen, the treatment should be repeated 2 or 3 times at 7-day intervals. Scaly leg, if not too bad, can be cured by a few applications of crude oil, kerosene, or kerosene mixed with petroleum jelly smeared on the shanks. If kerosene is used, it must not be allowed to touch the skin, as it burns severely.

In New Zealand, where a high proportion of the hens are of the light-breed strains, obtaining a broody hen just when she is needed for brooding is often difficult, and even when one is available it has to be proved that she will obey the natural instincts. Some hens make poor mothers and will even kill the chicks they hatch or that are given to them. Some are highly nervous and others are clumsy. Though it is not necessary to use the same hen as hatched the chicks to brood them, it is advisable to test her with some eggs a few days before it is intended to introduce the chicks to her. If she sits tightly on the eggs, she will probably accept the chicks readily.

A hen can usually brood a larger number of chickens than the eggs on which she can sit, especially if the weather is suitable. A heavy-breed hen can easily sit on 15 eggs and under favourable conditions can brood 18 chicks or more. In cold weather she should not be given more than 15 chickens. The smaller the brood, the better she can care for them.



Single and double fireless brooders, made from petrol cases, with the hovers or canopies raised.

Shelter for Hen and Chicks

The hen and chicks must be given proper shelter. A simple, inexpensive type of coop is a box or barrel placed on its side with roofing material nailed over the top to keep out rain. Some sort of front is necessary to confine the hen, but the chicks should be able to get in or out at will. Storm water must be excluded from the coop, which must be high enough not to cramp the hen. As the small chicks will do better if kept away from adult birds and even from older chickens, they should have a separate netted-off run.

Incubator chicks that are to be brooded by a hen should be given to her about the second day after they have been hatched, preferably after dusk.

The mother hen should be prevented from ranging the chicks about in wet grass and a guard should be made against the chickens getting drowned in the drinking-water pan. If the pan is deep and wide, place a brick or piece of wood in it to give a chick that falls in a chance to climb out.

Artificial Brooders

Broody hens will not meet the requirements of a sideline poultry keeper wanting to rear 200 or 300 chicks, in which case artificial brooders are desirable. Such a brooder is a mechanical device designed to do the work of the mother hen on a larger scale. As a rule, some heating system is used in conjunction with the brooder, but this article is intended for the householder with a few chickens, for whom a fireless (sometimes called "cold") brooder will suffice. In the type illustrated on this page the chicks warm the brooder with their own surplus body heat when the canopy is down. To an extent, the principle depends on reducing ventilation.

The essentials of brooding have been largely learned from the hen. The natural actions of a broody mother show that the chicks need to be able to get warm at any time. In addition, they need suitable feed, consisting of both animal and vegetable substances and also minerals; a sufficient supply of vitamins in the diet, such as chicks under natural conditions would get from fresh greens, worms, and insects; facilities for keeping the flock together; and sufficient ventilation. Artificial conditions, as opposed to natural, keep the chicks in one place instead of on the move, so provision must be made for disposal of droppings as completely and as frequently as possible and for protection from enemies and parasites.

The requirements quoted are all of equal importance, with, perhaps, ventilation requiring a little more attention than it might appear to warrant at first sight. This becomes difficult with a fireless brooder, as too little ventilation will weaken the chicks and too much will cool them unduly and also have a weakening effect.

Another essential for successful brooding, though not a part of the mechanics of brooding, is that the chicks be strong, healthy, and vigorous.

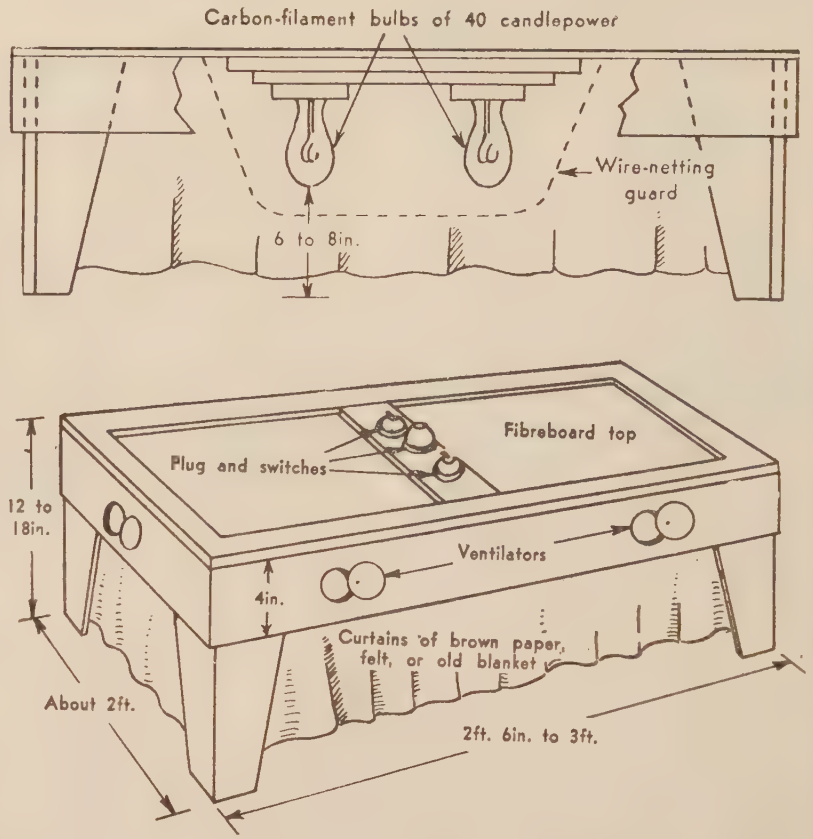
Brooder Temperatures

The desirable brooding temperature for young chicks is about that of the mother hen, and she probably warms closely-snuggled chickens to about 100 degrees F. In natural brooding, chicks are under the hen only a portion of the time. They can withstand a considerable range of temperature, but must be able to go back at will to a place of sufficient warmth. Therefore the fireless brooder can be improved by supplying some added heat, and some judgment is needed to decide what is required. It can be done by a warmed-up brick, a hot-water bottle, or an electric lamp. Discretion must be used according to the time of the day or night and the weather.

In the curtained type of brooder, with added heat, the temperature can be considered ideal when the chicks arrange themselves, especially at night, prone at the inner edge of the curtain with only their heads protruding to breathe the purer air. In the canopy type where no curtain is provided, the correct temperature will cause the chicks to arrange themselves at night in a circle around the brooder, neither crowded nor spread out so far that heat is wasted.

The thermometer is not the important item in judging whether the temperature is correct. More dependence should be placed on the actions of the chicks. Their chirping language will indicate rapidly whether they are comfortable and happy.

Artificially-brooded chicks should be trained very carefully at the start. The mother hen is able to call the chicks and inflict her will, so the owner must do what the brooder cannot. Proper brooder habits should be inculcated from the beginning. If the chicks learn to get warm by piling up or huddling in a corner, they are likely to continue that habit. They should be taught where the warmth is. After they have been placed in the brooder they should be examined at frequent periods and, at the least sign of chilling or crowding, pushed gently under the brooder. The training period is short.



A brooder heated by electric bulbs and suitable for small numbers of chickens.

Some form of dry litter should be used on the brooder house floor, but it should be of a type that the chicks will not eat, that remains clean under average conditions, and that is loose enough to permit the droppings to fall away from the top surface and moisture to be released readily. Straw has a decided advantage over most other forms of litter. Cleanliness is essential.

Teaching Birds to Roost

The weather at the time of the year will indicate how long the chicks should be kept in the brooder. At about 6 weeks of age the pullets can manage without heat and should be encouraged to perch on roosts. This reduces the danger of crowding or huddling, helps to improve their health, and causes them to develop more rapidly. Training perches should be spaced 3 or 4in. apart with fine wire netting underneath. If a netting ramp is made from the floor to the front perch, the pullets can easily be driven up to learn to roost and are prevented from scratching in the droppings which fall under the perches.

When they have learned to roost is the time to change them to roomier quarters for the next rearing stage. This type of rearing shed is commonly called a colony house, and at this stage ventilation is of the utmost importance. A colony house plan can be obtained from the Department of Agriculture.

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METEOROLOGICAL RECORDS FOR JUNE

Station	Height of station above M.S.L. (ft.)	Air temperatures in degrees (Fahrenheit)				Rainfall in inches					Bright sunshine hours
		Approx. mean	Difference from normal	Absolute maximum and minimum		Total fall	No. of days of rain	Difference from normal	Maximum fall		
				Maximum	Minimum				Amount	Date	
Kerikeri	201	53.3	+ 1.4	68.0	36.5	6.73	18		1.33	5	149.7
Auckland	160	55.0	+ 1.7	65.8	44.8	4.83	24	— 0.59	1.45	5	118.3
Tauranga	10	51.5	+ 1.8	65.7	33.4	7.13	16	+ 1.79	1.80	23	144.3
Ruakura	131	49.8	+ 1.9	64.2	27.6	4.74	23	— 0.07	0.51	12	89.9
Rotorua	980	47.8	+ 2.2	64.0	32.0	6.59	18	+ 1.28	1.55	5	105.0
Gisborne	12	50.6	+ 1.6	67.2	31.1	4.77	15	+ 0.76	2.44	29	160.5
New Plymouth ..	160	51.8	+ 1.8	61.8	37.8	7.78	23	+ 1.68	1.72	6	100.7
Napier	5	50.0	+ 1.6	67.4	30.1	3.82	12	+ 0.78	1.55	5	154.3
Taihape	2157	44.8	+ 2.0	63.2	29.2	4.33	26	+ 1.05	0.79	6	
Wanganui	72	50.8	+ 2.5	67.4	36.0	4.08	23	+ 0.78	0.65	7	104.8
Palmerston North	110	49.5	+ 2.8	68.0	29.8	4.67	25	+ 1.17	0.90	5	97.3
Waingawa	350	47.0	+ 1.4	64.0	27.0	5.18	17	+ 1.57	1.08	5	111.6
Wellington	415	48.0	+ 0.1	63.9	36.3	5.83	19	+ 1.50	1.17	12	104.9
Nelson	24	48.7	+ 2.5	62.2	30.8	4.66	12	+ 1.17	1.87	23	150.5
Blenheim	12	46.0	+ 0.5	66.1	22.8	3.53	12	+ 1.12	1.48	23	150.9
Hokitika	12	45.8	+ 1.2	61.2	28.0	9.54	18	+ 0.39	2.34	23	97.6
Hanmer Springs ..	1225	39.8	+ 0.0	57.8	18.5	2.53	9	— 0.92	0.83	23	106.4
Christchurch ..	22	43.2	+ 0.0	60.9	29.0	2.42	14	— 0.12	1.14	23	102.5
Ashburton	323	41.6	+ 0.4	61.6	26.8	2.56	9	+ 0.09	1.62	23	105.8
Timaru	56	42.9	+ 0.5	58.2	30.0	3.21	7	+ 1.42	1.72	23	118.6
Alexandra	520	39.7	+ 1.9	60.6	24.6	0.96	13	+ 0.20	0.22	23	92.7
Taieri	80	42.6	+ 0.8	58.1	26.8	2.62	15	+ 0.38	1.44	24	
Invercargill ..	32	42.8	+ 0.6	53.0	26.0	4.46	23	+ 0.71	0.95	12	59.9

SEED PRODUCTION IN NEW ZEALAND

Subterranean Clover

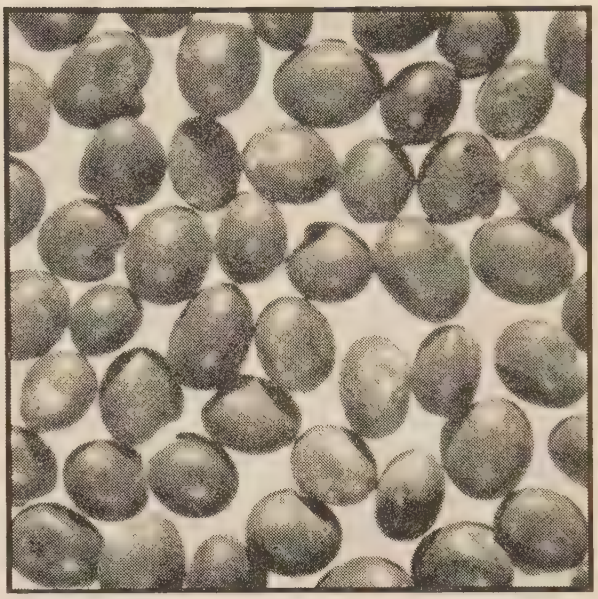
By J. P. BEGGS, Instructor in Agriculture,
Department of Agriculture, Blenheim.

SUBTERRANEAN clover has been grown for seed in New Zealand only relatively recently. When commercial sowings of this clover were begun in the Dominion about 20 years ago all seed was obtained from Australia, where it had been very popular for some years. However, it was not long before New Zealand growers turned their thoughts toward seed production and, though results in the early years were largely disappointing, some very satisfactory yields of seed were soon being obtained. Sound methods of seed production have now been evolved, methods which have been developed under and have proved suitable for local conditions.

DURING the past 20 years subterranean clover has risen from the status of an experimental plant in New Zealand to that of a proven friend to the farmer. It has proved particularly valuable on light to medium-class land where the higher-producing perennial clovers cannot persist and produce well, though it may also be regarded as a valuable adjunct to white clover on much medium-class land.

As a surface-sown plant in conjunction with the use of superphosphate it has proved the salvation of much hill country in the North Island. Because of its outstanding response to phosphatic topdressing it has made the topdressing of this type of country economic and on much land has facilitated the control of secondary growth. In the South Island it has proved a great fertility builder on light, shingly land and has allowed the establishment of permanent pasture on this type of land. It is also giving promise as a surface-sown plant on some hill country in the South Island, though it has not been as widely used for this purpose there as in the North Island. In both islands it has proved an extremely-valuable clover for the production of fat lamb.

A dense growth of subterranean clover suitable for seed production.



Subterranean clover seed (five times natural size).

Description of Plant

The subterranean clover plant (*Trifolium subterraneum*) is an annual, but because of its ability to re-establish itself by reseeding it is for practical purposes a permanent pasture plant. In late spring or early summer the plant sends out runners which vary in length from a few inches to several feet, depending on conditions. In an established stand which has been closed for seed production these runners form a tangled mass which can cover the ground completely to a depth of a foot or more.

The flowers are white and are borne on slender petioles or stalks which are usually 2 to 3in. long. After fertilisation the flower gives place to a small burr which, when mature, is about 3/16in. in diameter. As the burr grows, the stalk on which it is borne turns downward and forces the burr into the soil, but when the growth of herbage is heavy many burrs fail to reach the soil and remain suspended in the network of stems. Burrs coming into contact with loose soil often bury themselves completely, and many disappear in cracks in dry ground.

The seed, which is dark purple, is usually two to three times as large as red clover seed and is tightly encased in burrs, from which it is rather difficult to dislodge at threshing. Each burr normally contains four seeds.

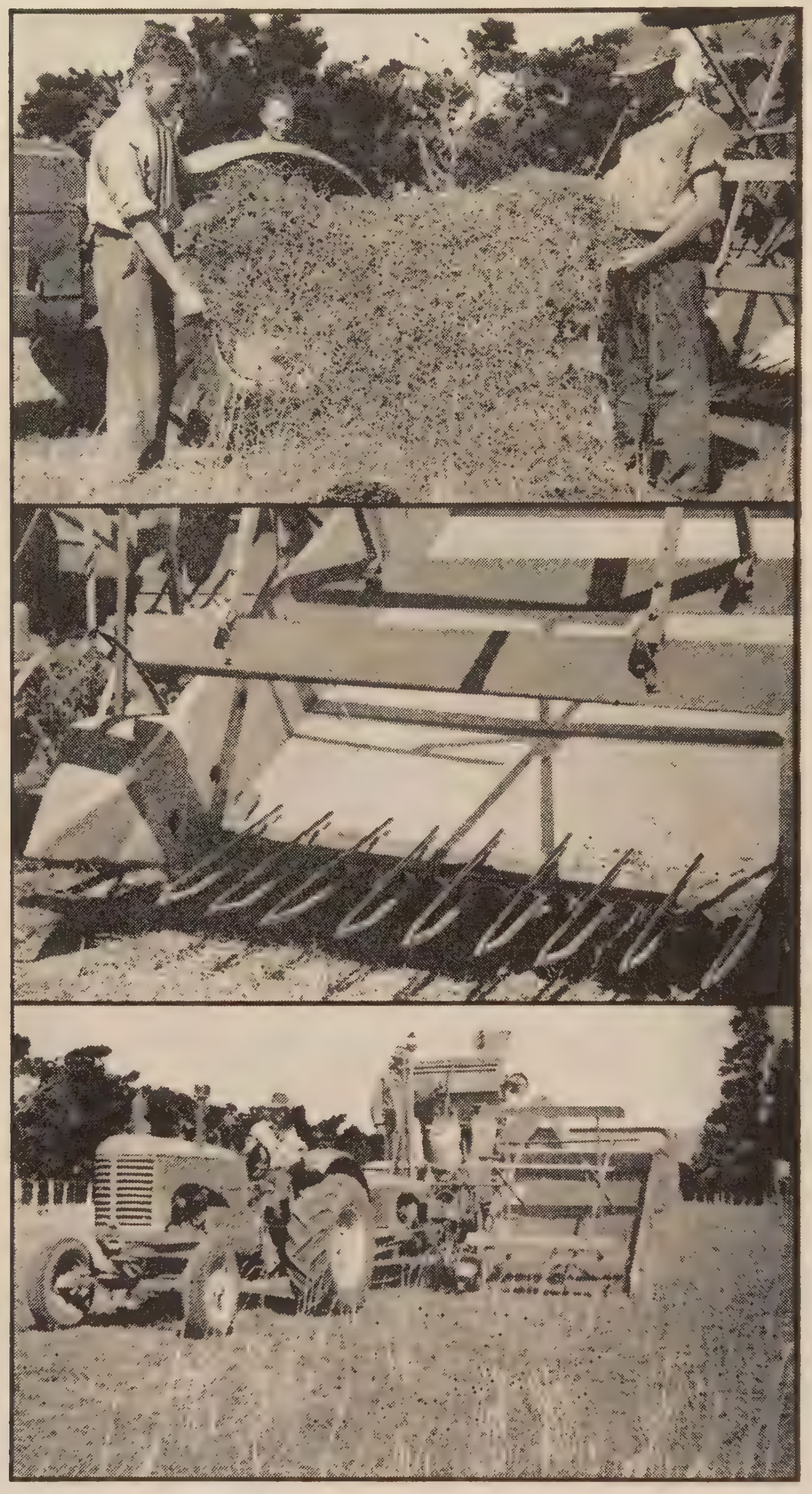
Two Strains Grown

Only two strains of subterranean clover are grown commercially in New Zealand and Certified seed of both is being produced. One strain, known as mid-season, corresponds to the Australian Mount Barker strain; the other, designated late flowering and corresponding to the Australian Tallarook type, flowers and matures later. It is generally recognised that seed is easier to harvest from the late-flowering than from the mid-season type, which tends to bury its seed in the soil to a greater extent.

Land from which subterranean clover seed is produced may be divided into two distinct classes: First, areas which have not been sown with a view to the harvesting of seed, or where seed production is a secondary consideration; such areas are occasionally closed for seed merely as a result of favourable weather permitting their temporary withdrawal from their main purpose of grazing. Second, paddocks that are sown down especially for seed production, with grazing an incidental consideration.

In the earlier years of seed production practically all harvesting was of the incidental class, but of later years the specialised type of seed production has increased to a

HARVESTING SUBTERRANEAN CLOVER SEED



An ordinary header harvester when fitted with lifting fingers is able to harvest subterranean clover seed satisfactorily. Upper—A heavy crop forming a dense mat of herbage suitable for harvesting with a header harvester. Middle—To reduce the chance of picking up stones, lifting fingers may be fitted only on alternate fingers of the harvester. Lower—A header harvester at work in subterranean clover.

marked degree. This has been caused largely by the drop in price of the seed, with the result that heavier yields have been necessary to give a satisfactory return for the time and labour spent in harvesting.

Soil Type and Climate

Subterranean clover will grow on a variety of soil types, but it grows most vigorously on light to medium-class friable soils. For the satisfactory production of seed crops a heavy growth of herbage is important, as it increases the quantity of seed produced as well as preventing many of the burrs from reaching and penetrating the soil.

The aim is to secure, if possible, a growth of pure subterranean clover, as the presence of grass or foreign clover growth usually makes harvesting more difficult. On the better types of soil a pure stand is difficult to secure, for on such land foreign clover, grass species, and weeds are almost sure to make their presence felt.

Light to medium-class soil with a not-too-abundant supply of humus and nitrogen is ideal for the production of a good subterranean clover seed crop. Surface stones are highly undesirable, especially when a hay rake is used at harvest. If some stones are present in an otherwise-ideal paddock, the use of a heavy roller before the land is closed for seed, followed by direct heading of the crop, will overcome the difficulty.

A suitable climate is essential for both the growth of the crop and harvesting. For best growth of subterranean clover early autumn rains, a mild winter and spring, and a good supply of moisture in early summer are needed. Under such conditions the clover establishes early in autumn, grows slowly through the winter, and is then able to grow vigorously in spring and early summer.

However, important as the growing period is, good harvest weather is equally essential, for heavy rain after the seed has ripened can result in the germination of the seed and the consequent loss of the crop. Therefore, reasonably-consistent results from the harvesting of subterranean clover seed can be expected only in districts which are favoured with a settled, dry summer climate. Probably the most favoured district in this respect is Marlborough, and it is there that the best and most consistent yields of seed are obtained.

Incidental Seed Crops

It is not intended to deal fully with methods of establishing subterranean clover in normal farming practice, as seed crops are taken from areas which have been sown in a variety of ways. The seed may have been sown with rape, turnips, oats, or grass or in some other manner; perhaps after a few years the area has run to strong and dominant subterranean clover growth, and an abundance of feed on the remainder of the farm has induced the farmer to close this area for a crop of seed. Again, the subterranean clover growth may have been indifferent for a number of years, but cultivation and an application of fertiliser or lime have made possible the harvesting of a reasonable crop of seed.

Such crops can be regarded only as catch crops, as the farmer is taking advantage of favourable weather or other circumstances to secure an additional cash return. Of more interest for seed production are the specialised seed areas.

Specialised Production

For specialised seed production the clover is usually sown at a heavy rate, with or without a cover crop, the aim being to secure as rapidly as possible a dense and deep mat of clover, free from grass or other foreign growth. The rate of seeding for such areas usually is between 10 and 18lb. per acre. The seed is sown as early as possible in the autumn if it is intended to harvest the seed in the first year.

A cover crop of barley or oats may be used and is desirable if the seeding is being carried out rather late in autumn. When such a cover crop is used it is necessary to drill the cereal first and then roll the ground to provide a reasonably-fine and consolidated seed-bed for the clover. The cereal is harvested when mature, followed later by the subterranean clover.

However, though the cover crop method is quite successful, sowing the clover alone is desirable when seed production is specialised in. The ground should be worked early so that moisture will be conserved during summer, permitting early-autumn sowing despite dry conditions. When two crops are sown together one usually suffers at the expense of the other. That was well demonstrated in one of the best paddocks in Marlborough in the 1946-47 season. This clover was sown with a cover crop of barley with the object of harvesting the barley first and the clover later. The final result was a very prolific growth of clover, but the barley was smothered to such an extent that no effort was made to harvest it. The clover crop yielded 750lb. of machine-dressed seed per acre, and it seems reasonable to assume that, if a heavy crop of barley had been secured, the yield from the clover would not have reached that gratifying figure.

Nevertheless, much can be said for having a double chance when aiming mainly at subterranean clover seed production, for unfavourable weather just before harvest may destroy all chances of harvesting the clover.

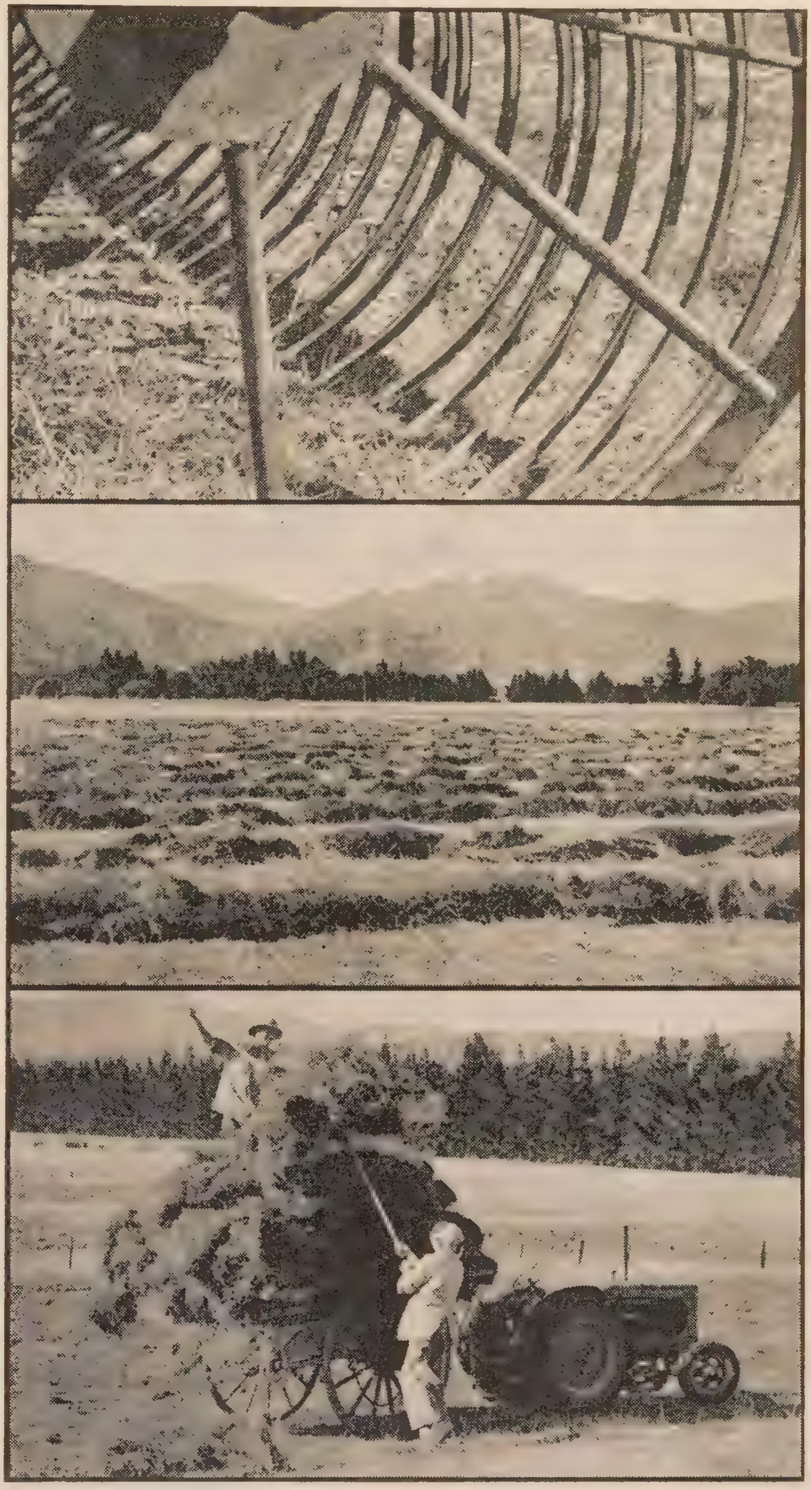
Whenever subterranean clover is sown, whether for specialised seed production or not, both lime and superphosphate should be used. The lime should be harrowed into the seed-bed before the seed is sown, 1 ton per acre being a suitable application. The superphosphate should be sown with the seed at the rate of 1 to 1½cwt. per acre.

Subsequent Management

On specialised seed-production areas subterranean clover stands normally are not grazed at all during the first year. In subsequent years a stand may be grazed lightly, but the securing of a deep mat of vegetation is extremely important if a good yield of seed is to be secured.

No hard-and-fast rules can be laid down about grazing management, for this varies with the season. When the winter is mild a fair amount of grazing may be carried out without detriment;

HARVESTING SUBTERRANEAN CLOVER SEED



Where mowing is not practicable a subterranean clover seed crop is left to become dead ripe and then raked up when moist with a stiff-tined hay rake. Upper—A suitable type of rake for the work. Middle—Subterranean clover lying in windrows after being raked. Lower—A subterranean clover crop being carted to the stack after being raked into windrows.

in other years little grazing might be obtained. The nature of the re-establishment in autumn has an important influence.

It has been found in the past that two good crops of seed were seldom secured from one area in successive years, but suitable cultivation after the harvesting of the first crop has recently been shown to result in the production of an equally-successful succeeding crop. That has been strikingly demonstrated in Marlborough. A paddock which produced a crop of 750lb. of machine-dressed seed per acre was disced, harrowed, and rolled after harvest, a dressing of 1 ton of lime and 1cwt. of superphosphate being applied after the discing. The area was saved for seed the following season and the outstanding yield of 1260lb. of machine-dressed seed per acre was obtained.

Cultivation of established stands of subterranean clover in the autumn of the season before seed is harvested undoubtedly will greatly increase the vigour of the clover, with a corresponding influence on the yield of seed. This recommendation applies equally to ordinary grazing stands of this clover, and both feed and seed production could be increased greatly by extending this type of work. The application of 1cwt. of superphosphate and 1 ton of lime per acre at this time is also an important factor in increasing production from the clover.

After a few years' vigorous growth of subterranean clover in a paddock grass begins to make its presence felt, and as the fertility of the soil improves the proportion of grass to clover increases. This is highly desirable on ordinary grazing land, but in seed-production areas it is a hindrance at harvest time. A pure clover sward is best for the production of a good seed crop.

When grasses invade a seed-producing paddock the adoption of some means of removing them is desirable. Cultivation alone aids greatly, but it is more common to take advantage of the built-up fertility by taking a crop or two. Quite often after a few years of vigorous clover growth it is possible to take a wheat crop from the area. This serves the double purpose of providing a good cash return and reducing fertility, with the result that clover growth rather than grass growth is again favoured.

If cultivation is managed so that the final ploughing returns the bulk of the clover seed to the top of the furrow, resowing will not be needed. It will merely be necessary to cultivate in autumn to produce a suitable seed-bed. The application of 1 ton of lime and 1cwt. of superphosphate at this time would also be highly desirable, both being harrowed lightly into the seed-bed.

Harvesting Methods

Subterranean clover is well known for the difficulties it presents to the harvester of its seed. Unlike most annual plants, it does not merely shed its seed on the surface of the ground but tends to bury the burrs containing the seed. In loose soil much seed is forced into the ground, but when the surface is hard most of the burrs remain at ground level, apart from those which penetrate small cracks or other soil irregularities. The persistence of the clover in the face of adverse weather is really the result of this tenacious manner in which it reseeds.

Another factor which can make a subterranean clover seed crop very difficult to get into the bag is the weather. If prolonged rain falls after the seed has ripened and just before harvesting is begun, the seed germinates and thus makes harvesting impracticable.

Many different harvesting methods have been evolved in New Zealand and Australia. None is completely efficient, but some recent operations carried out under ideal conditions have proved very effective. The methods used in Australia differ from those which have been evolved in New Zealand. The cultivation of the surface soil as a harvesting operation appears to be much more common there than in the Dominion. A roller covered with sheepskin has been widely used to collect the burrs, several runs being made over the same area, with harrowing between runs to bring a fresh batch of burrs to the surface. Another method is the grading of a thin layer of surface soil into rows, the burrs being later separated from the soil so gathered.

In New Zealand several methods have been used with varying success. One of the earlier machines tried was the chain drum stripper, but results were relatively poor and this method has never been used widely. It had the disadvantage of adding much soil and other foreign matter to the seed. Other crops have been cut and harvested like an ordinary hay crop, the material being stacked, baled, or threshed from the paddock. A header or clover huller is used for threshing, the straw being put through twice to secure efficient threshing. A very deep mat of growth to hold a proportion of the burrs above ground level is necessary if this method of cutting is to result in a reasonable yield of seed.

Next, lifting fingers similar to but smaller than pea fingers were fitted to the cutter bar of the mower. This was a great improvement on the ordinary mowing gear, as the fingers lifted the burrs clear of the ground in front of the blade. The crop is allowed to become dead ripe before it is cut, but to avoid breaking the stalks bearing the burrs it is advisable to cut the crop when it is bearing light dew or other moisture. After being dried the material is collected and later threshed. Again, either a header or a clover huller is used, though the huller gives best results. A period in stack makes for easier threshing, though the straw usually has to be put through twice for satisfactory threshing.

Another implement commonly used in the harvesting of subterranean clover seed is the stiff-tined hay rake. After the crop has become dead ripe the herbage is allowed to become moist with dew or light rain to strengthen the fragile stems which bear the burrs. The material is merely raked where it grows, no mowing being carried out. Any burrs having a loose hold on the soil are dragged out in the raking. The material is then allowed to dry thoroughly in the windrow before it is threshed, though again a period in stack is likely to facilitate threshing and improve the yield of seed. Threshing is carried out with a header or clover huller. The correct degree of moisture in the herbage before raking can be judged only by experience. Just sufficient to toughen the stems is required. If the material is raked when it is excessively moist, a protracted drying period in the windrow is necessary. Some farmers rake when the crop is quite dry, and though the loss of burrs is greater, quite reasonable yields of seed may be obtained.

Direct Heading

The labour shortage of recent years has led to the adoption of many short cuts in farming methods, and perhaps the header harvester has been responsible for more labour saving than any other farm implement during this time. Certainly the farmer now uses this implement for harvesting at every possible opportunity. However, until a few years ago nobody would have considered it possible to harvest subterranean clover seed with this implement using the direct heading method. Yet this operation has now been established as very satisfactory, giving excellent results if conditions are suitable.

For successful direct heading the paddock must carry a good, deep mat of growth. Under such conditions many of the burrs are prevented from reaching the soil and the lifting fingers are provided with a good bulk of growth on which to work. This is important in direct heading, as an even flow of material up the canvas and into the drum promotes efficient threshing. With an uneven, "broken" type of crop the clover is inclined to enter the drum in lumps instead of in the form of a mat, and then much seed is lost through inefficient threshing. Short, thin crops or those that are markedly uneven are harvested more satisfactorily by some other method, such as raking.

For direct heading the header is fitted with special lifting fingers, which lift most of the burrs clear of the approaching knife. The lifters, which are attached to the fingers of the cutter bar, slide the clover gently up on to the canvas and thence to the drum. In a suitable, even, heavy crop the canvas has little part in conveying the material upward; it is drawn directly from the lifters to the drum in the form of a carpet or mat, the main lifting force coming from the drum. The lifters may be attached to every finger or to alternate fingers; if stones are likely to be encountered, the latter setting is advisable to reduce the likelihood of picking them up.

Subterranean clover to be direct headed must be dead ripe and dry. Warm north-west winds greatly facilitate threshing. The setting of the header is much the same as for threshing red clover except that the finishing riddle is slightly larger.

In earlier direct heading attempts in Marlborough an extra concave made up of clover huller rasps was fitted to the header with the object of promoting threshing efficiency. This fitting caused damage to the seed until the

Subterranean clover has been used widely to increase production on country such as this in the Wairarapa, but seed production is confined almost entirely to Marlborough.

rasps became worn. Now the ordinary standard header is used and is found to give satisfactory results without the extra concave.

Provided the header is allowed to travel very slowly, surprisingly-good results may be obtained by direct heading. One farmer using this method in the Marlborough district last season secured the astonishing yield of 1260lb. of machine-dressed seed per acre from a 14-acre paddock. This yield was obtained by putting the material through the header only once. Threshing thoroughly and slowly once is more satisfactory than threshing twice in a less thorough manner.

Very slow travelling by the header is of vital importance. If the progress is too fast, seed is lost through breaking of the seed stalks and inefficient threshing.

Yield

Yields secured from subterranean clover seed crops are so variable that it would be impossible to state a figure for an average or normal yield. The yields of 750lb. and 1260lb. per acre from one paddock in successive years are outstanding, but they indicate what can be achieved. However, under good seasonal conditions and good management a yield of up to 500lb. of machine-dressed seed per acre of the late-flowering strain could be expected.

Machine Dressing

Because of its resistance to threshing, subterranean clover seed is likely to be damaged during this operation. Shelled and chipped seed is therefore common in some lines, and it is not possible to remove by machine dressing all seed damaged in this way.

Many lines of seed show a low percentage of purity because of damage during threshing, and farmers should give this subject special attention when dealing with subterranean clover seed. A common mistake is to allow considerable quantities of seed to return to the drum in an effort to secure the maximum of threshed seed. It is better to allow some seed to pass into the bag partly threshed than to ruin the whole line through over-threshing. Partly-threshed seed often may be cleaned satisfactorily at machine dressing by using the polisher.

Rape and wild turnip seed cannot be completely removed from subterranean clover seed at machine dressing, so saving an area for seed is a mistake if any quantity of these impurities is present in the crop. Seeds of vetches are also impossible to remove completely. Striated clover is often associated with subterranean clover stands, and this impurity, too, is impossible to eliminate from the seed.

The most common impurity to be dealt with during dressing is soil in small particles of about the same size as the seed. However, though the elimination of this impurity may occupy considerable time during dressing, it can usually be dealt with satisfactorily.

Production and Imports

No records of the total production of subterranean clover seed in New Zealand are available, but Certified seed was first produced in the 1938-39 season. Since then production has fluctuated considerably from season to season, the figures for Certified seed being as follows:—

	Mid-season strain		Late-flowering strain	
Season	Acreage harvested	Quantity of machine-dressed seed (lb.)	Acreage harvested	Quantity of machine-dressed seed (lb.)
1938-39 ..	70	10,763	—	—
1939-40 ..	—	—	—	—
1940-41 ..	—	—	—	—
1941-42 ..	54	11,957	—	—
1942-43 ..	—	—	—	—
1943-44 ..	44	14,802	—	—
1944-45 ..	33	31,508	—	—
1945-46 ..	20	680	38	3,561
1946-47 ..	195	28,242	39	10,028
1947-48 ..	153	28,070	37	17,283

All that seed was grown in the Marlborough district with the exception of the following areas of mid-season strain: 22 acres (4684lb.) grown in North Canterbury in 1946-47; 40 acres (169lb.) grown in North Otago in the same season; and 7 acres (1056lb.) grown in Mid-Canterbury in 1947-48.

For an area to be eligible to produce Certified seed it either must have been sown with New Zealand Certified seed or with Australian Certified Mount Barker or Tallarook seed, or a sample of a previous harvest of the area must have revealed a satisfactory standard under plot test. In addition, the area is subject to a field inspection at flowering time to determine the strain purity of the crop.

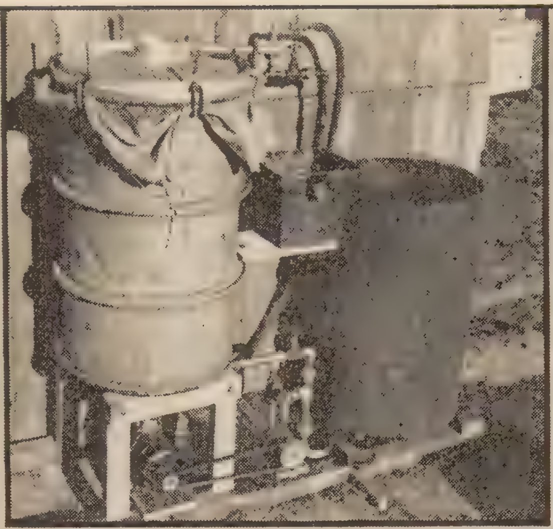
Though earlier figures of the quantity of subterranean clover seed imported into New Zealand are not available, the peak of importation was probably reached in 1937. Annual importations since then have been:—

Year	Tons	Year	Tons
1937 ..	377	1943 ..	70
1938 ..	139	1944 ..	70
1939 ..	148	1945 ..	32
1940 ..	270	1946 ..	158
1941 ..	90	1947 ..	137
1942 ..	91		

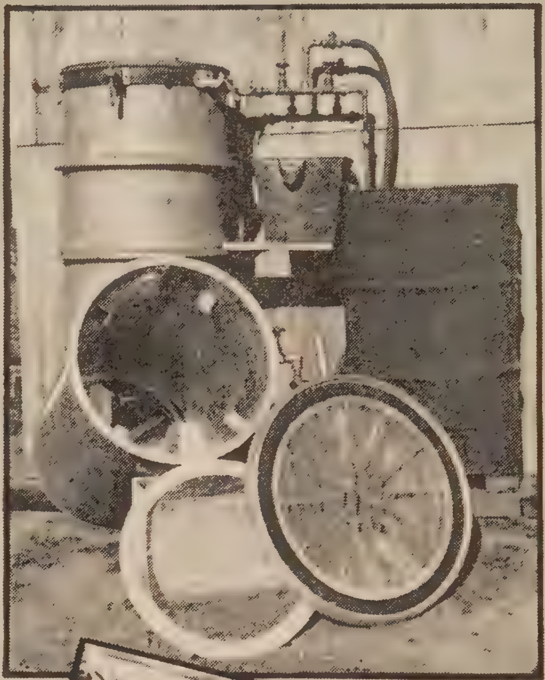
Future of Industry

To forecast the future of subterranean clover seed production in New Zealand is difficult. However, it is obvious that this clover has proved very valuable in many parts of the country, and its use has become very widespread in only a few years. Without doubt it will continue to be popular and a continual supply of seed will be required. Should surface sowing from aircraft become popular, a new demand for seed will be set up.

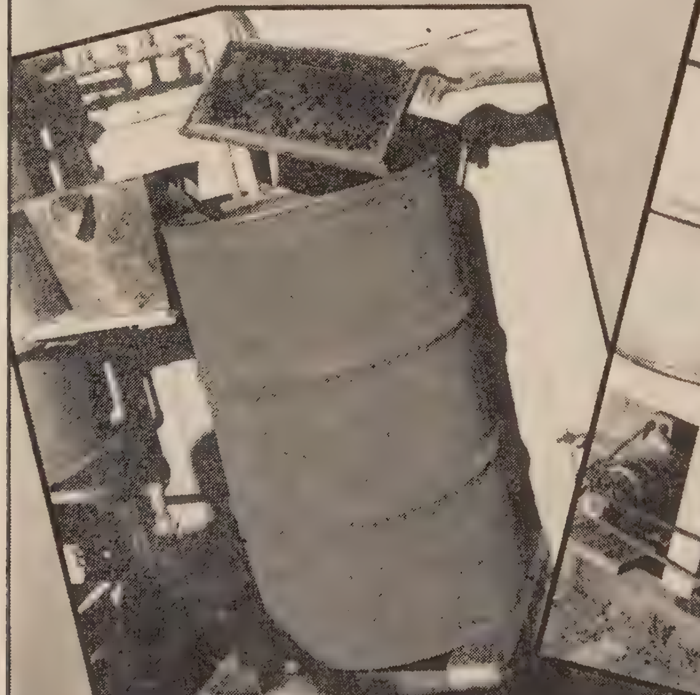
Therefore, it seems likely that a good demand for subterranean clover seed will continue in New Zealand. High-quality seed can be produced economically in the country, and while that remains so it is reasonable to expect that districts which are favoured with suitable soil and climate will incorporate the production of subterranean clover seed in their normal farming practice.

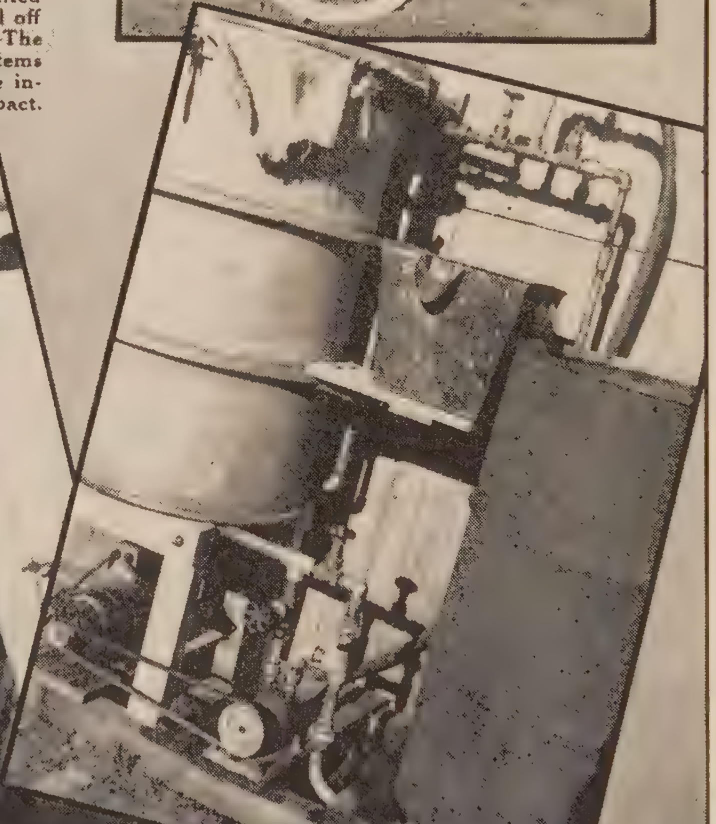


OPERATION OF HYDRAULIC PRESS TO SALVAGE BEESWAX



Above—The assembled unit with the lid in position ready to run a pressing from the renderings of up to 12 supers of combs. Right—Component parts of the pressure drum, showing the inner liner and the under surface of the pressure lid. A strong wire-mesh screen is fitted at the base of the inner liner, and four supports for the second strainer are fitted near the top. The cleated lid is fitted on the inside with a rubber gasket and perforated plate. Lower left—About 30 combs are placed in the boiler drum for a single rendering. The melted material from each rendering is then dipped off into the pressure drum. Lower right—The valves controlling the water and steam systems of the unit are conveniently placed and the installation of the motor and pump is compact.





Beeswax Salvaged with a Hydraulic Press

BECAUSE of the objectionable nature of salvaging beeswax from culled combs, cappings, etc., beekeepers are usually reluctant to undertake this essential part of their apiary work. As this results in the loss of much beeswax yearly, any system which is reasonably efficient in dealing with the salvage of beeswax and is more attractive than the manual method deserves attention. In this article E. Smellie, formerly Apiary Instructor, Department of Agriculture, Christchurch, describes a method devised by Mr. E. B. Diehl, of Waiau, North Canterbury, by which good-quality wax is salvaged fairly efficiently with a hydraulic press.

IT is not claimed that Mr. Diehl's system retrieves the same amount of beeswax from a given number of combs as the hand screw-press, but the amount of wax left in the slumgum is not very great and its value insufficient to compensate the extra time involved in retrieving it with the hand screw-press method.

Another important advantage with this method is that there is no fire hazard during the rendering process.

Construction of Press

The hydraulic press is made from two open-topped 44-gallon drums—a pressure drum and a boiler drum. The drums are connected at their bases by means of a pump and a system of pipes and control valves to regulate the transfer of water to each drum. Steam inlets are also placed at the base of each drum (see diagram below).

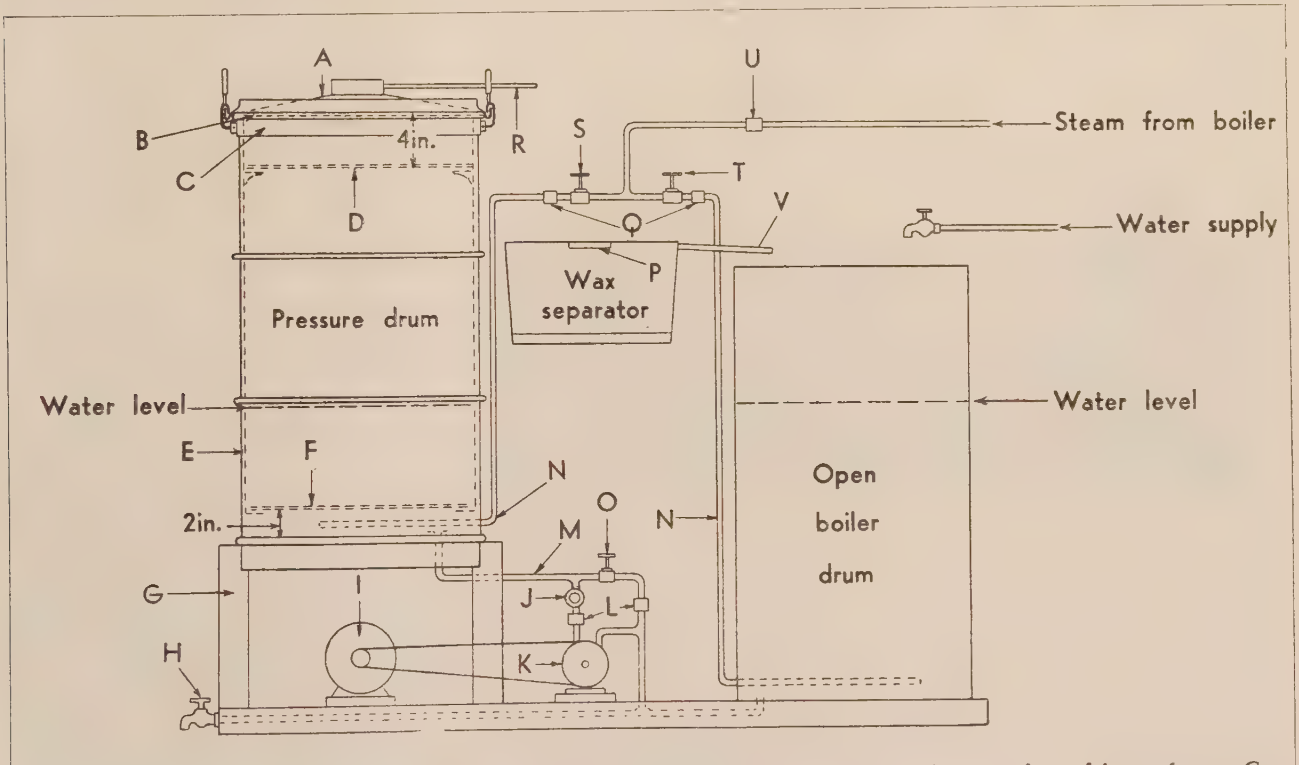
Inside the pressure drum a flanged liner is supported from its top edge. The flange is 1in. wide and the inside diameter of the liner is 1in. less than that of the outer drum. The length of the liner is 2in. less than the depth of the drum. A strong wire-mesh screen is fitted at the base of the liner and a similar screen rests on supports that are soldered 4in. from the top inside edge.

The lid of the pressure boiler is of a special type with a rubber sealing gasket on the inner edge and is also fitted with a heavy-gauge perforated strainer plate resting on cleats to provide a free passage for wax. On the top outer surface of the lid there is a wax collector ring and a run-off pipe. This unit is cast in aluminium from a pattern specially made and is held in place by a series of quick-release clamps attached to a steel band fixed below the top outside beading of the pressure drum.

Method of Using Equipment

In rendering old combs with this unit the boiler drum is two-thirds filled with water and the pressure drum about one-third and steam is applied to each to bring them to the boil. Combs are then layered criss-cross in the boiler drum and forced below the level of the water and held submerged by a weight. The drum will take approximately 30 combs in one charge.

As the combs melt, the wax and cocoons are skimmed off with a dipper and transferred to the pressure drum. When no further wax is rising the frames are removed and a fresh charge placed in the boiler drum. Up to 12 supers of combs may be handled in one pressing, but when sufficient wax material has been transferred to the pressure drum, the upper strainer screen is placed in position and an



The component parts of the hydraulic press. A—Dome. B—Mesh screen attached to lower surface of inner dome. C—Metal band with clamps attached. D—Wire-mesh screen resting on lugs on liner. E—Inner liner. F—Wire-mesh screen. G—Wooden stand. H—Water drainage tap. I—Reversible ¼ h.p. electric motor. J—Water pump control valve. K—Reversible pump. L—Barrel unions. M—Water inlet pipe. N—Steam inlet pipe. O—Valve controlling the return of water by gravity. P—Wax overflow to moulds. Q—Barrel unions. R—Overflow pipe. S—Steam control valve for pressure drum. T—Steam control valve for boiler drum. U—Non-return check valve. V—Return water outlet.

HYDRAULIC PRESS FOR SALVAGING BEESWAX . . .

opened-out sugar bag placed over the open top and the lid clamped down.

At this stage the steam is directed into the pressure drum and the contents brought to a vigorous boil. In a few minutes the steam is shut off and directed again into the boiler drum and the pump brought into operation. When valve J in the diagram is opened and valve O is shut the pump draws hot water from the boiler drum and forces it up through the pressure drum. Under this impetus the wax is driven through the screens and thence out through the top opening and spout to a wax separator, whence the water returns to the boiler drum and the pure wax runs off into a bucket or mould.

After the wax run-off decreases until no more wax is flowing from the separator, the pump is stopped and valve J is closed. Valve O is then opened for the water to return by gravity from the pressure drum to the boiler drum. When the water level in the pressure drum has been lowered approximately 6in., as may be seen by the rise of water in the boiler drum, valve O is closed and the steam again used to agitate the contents of the pressure drum. Pressing is then repeated. These operations may be repeated as often as desired, although three pressings should suffice to retrieve all the wax that is economically recoverable.

The residue from the pressure drum, now contained in the inner liner, is removed by hoisting the liner clear of the drum, removing the top strainer, and pouring the dross into a suitable container for disposal. The liner and screen are replaced and pressing can then be continued with only a few minutes' delay.

From the results obtained in trial runs it is considered that up to 100lb. of clean wax can be recovered from combs in a working day.

Windmill Used to Remove Milking Shed Waste

AN effective method of removing droppings and drainage from his milking shed by means of an old windmill and pump is used by Mr. R. J. Hart on his small farm at Whakaronga, Manawatu. The windmill and pump, which had been discarded, were overhauled and mounted on a pole over a sump of 40-gallon capacity. The shed waste is pumped through a 60ft. hose and is spread over adjacent pasture, the outlet end of the hose being moved periodically to give wider coverage.

The pole was cut from a macrocarpa tree and the sump is a 40-gallon oil drum with one end cut out. The pump handles all the shed waste without trouble, provided the heavier material is sufficiently diluted with water. A screen is provided to exclude debris such as leaves and twigs, and a pebble trap is fitted to catch small stones.

With a tank and spreader the liquid may be applied to any part of the farm.

—*H. A. DU FRESNE,*

Farm Dairy Instructor, Department of Agriculture, Palmerston North.

New Dominion President of Y.F.C. Federation

Mr. E. Rabbidge, jun., of Glenham, Southland, was elected Dominion president of the New Zealand Federation of Young Farmers' Clubs at the fifteenth annual general meeting, held in Auckland on June 21 and 22. Mr. A. O. Lloyd, Te Puna, Bay of Plenty, was elected vice-president, and Mr. J. Barclay, Dominion president in 1947, was elected a patron of the federation.

Every aspect of the federation's activities was carefully considered at the meeting and it was agreed to continue the national activities undertaken the previous year. Some suggestions for further national activities were referred to the Dominion executive committee for more careful consideration, as many delegates felt that in holding too many national activities the federation ran the risk of hampering the effective work of the movement in the clubs themselves; it was freely admitted that it was in the clubs that the most valuable phases of the organisation's work were to be seen.

Amendments to Constitution

Two important amendments to the constitution were a reduction to 2s. 6d. for annual membership subscriptions of members of secondary school clubs and a change in the title and composition of district executive committees. These committees are to be known as district committees (a term which in any case has become common usage), and the basis of each committee has been altered to give effective representation from every club in each district.

National Memorial

At the date of the meeting the national Y.F.C. memorial fund, being raised to commemorate the memory of those members who lost their lives in overseas service in the Second World War, stood at £15,516 8s. 11d. The objective of the fund is £20,000 for the purpose of erecting additional buildings at Massey and Canterbury Agricultural Colleges to provide facilities for special short courses for Y.F.C. members. The meeting decided to close the appeal on May 15, 1950, by which time it was hoped that the goal would be reached.

In his report the Dominion president for 1948-49, Mr. D. G. McLachlan, stated that on April 30, 1949, there were 316 active clubs. That represented an increase of 10 clubs compared with the number the previous year. In the year 24 new clubs had been formed, but 14 clubs had been temporarily closed.

National activities undertaken in the 1948-49 year included the debating contest (won by Upper Franklin Club) and the stock-judging contest, in which the Christchurch district team won the trophy for the highest team aggregate.

WINDROWING ATTACHMENT FOR HARVESTING RYEGRASS

By P. THAINE, Assistant Fields Instructor, Department of Agriculture, Rangiora.

IT is widely recognised that the most efficient method of harvesting ryegrass is by cutting with the binder and threshing out of stook. Owing to labour costs and the introduction of the header, this method has declined in popularity until today, in Canterbury, the header is used almost exclusively. Good results have been obtained by windrowing the crop with either the mower or binder and picking it up with the header, Though this system of threshing is quite satisfactory for normal crops, heading costs are high when crops are thin, and the windrow does not have sufficient bulk to prevent seed falling to the ground as the pick-up comes in contact with the swath. A North Canterbury farmer has overcome these difficulties by using the simple attachment described in this article.

Attachment adjusted so that cut material is deposited near the wheel.

THE materials required were a piece of sheet steel or tin about 3ft. 6in. x 4ft., a rod of ⅜in. steel about 4ft. 6in. long, 2 pieces of flat steel each about 2ft. 6in. to 3ft. long, a length of cord, and a few nuts and bolts. The piece of sheet steel was taken from an old binder platform and cut to the size required. (The size of the sheet depends on the binder in use, as it must be made to fit right under the table.) The ⅜in. steel rod was then fitted across the sheet and attached by U bolts at either end so that the steel rod acted as an axle upon which the steel sheet pivoted. The next step was to attach the sheet to the binder. This was done by fitting steel stays at either end of the table to act as a support for the attachment. The stays were extended from the table and strapped by light steel at either end of the ⅜in. rod.

When the binder was in motion it was found that uneven ground was causing the sheet to buckle, but the defect was eliminated by cutting one corner on an angle. The sheet was weighted with pieces of old iron, which were placed at either corner of the attachment near the table. Cord was used to tilt the sheet, the cord being tied to one corner, threaded through a ring on the knotting and packing machinery, and carried across the elevators to the whip holder. At this point two rings were tied to the cord about 12in. apart and fitted over a piece of wood which was placed in the whip holder. The points at which the rings are tied depends upon the crop which is being harvested, as this determines the angle at which the sheet will operate.

The only alteration which had to be made to the binder was the removal of the knotting apparatus. By keeping the packers in position it was found that the crop was kept on the move and the flow was more even.

Opening a Paddock

The method of opening a paddock is to cut three rounds with a mower. When windrowing the first two rounds with the binder the sheet is held in position against the table, which allows the cut material to pass over the tin and fall alongside the mown swath. When the binder comes round for the third time the attachment is released and the material is deposited near the wheel. At the start of the next round the sheet is again brought up under the table and the crop allowed to flow over the tin and be placed alongside the previous cut.

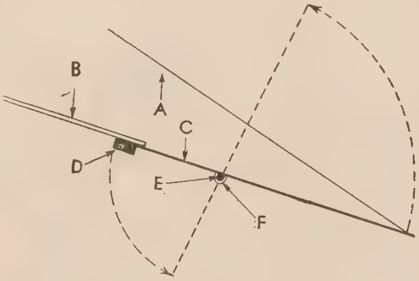


Diagram showing details of the attachment. A—Cord. B—Table. C—Steel sheet. D—Weight (there is also one on the opposite corner) to counterbalance larger side of sheet. E—3/8in. steel rod. F—U bolt.

The result, when a 6ft. binder is used, is to place two rows in one, giving a windrow every 12ft. In this way heading costs are kept to a minimum, threshing time is halved, and, in the case of light crops, there is added bulk and the header is able to work more efficiently. The attachment could be used to advantage on most cropping farms and the cost of construction is negligible, as the materials required could be found in many farm yards.

◆

The result obtained when the attachment is used with a 6ft. binder: Two rows are placed in one, giving a windrow every 12ft.

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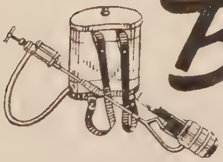

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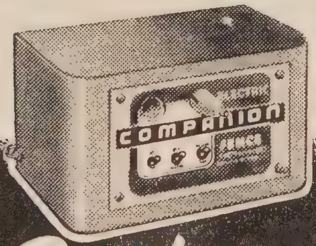

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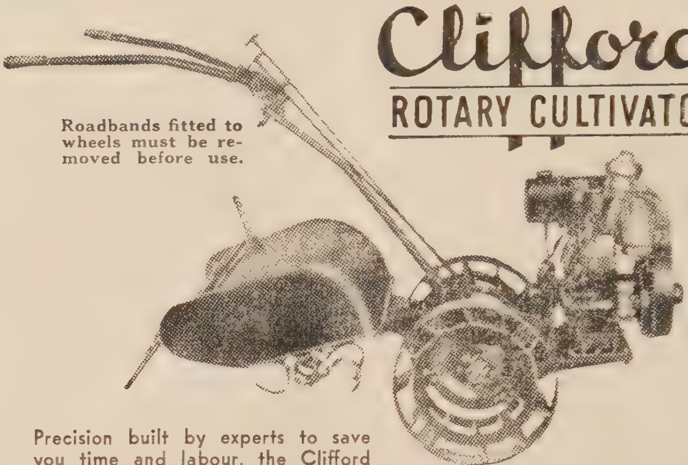

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CROP AND PASTURE COMPETITIONS

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BEFORE the war crop and pasture competitions were conducted in most districts in the Dominion. During the past 2 or 3 years many of them have been revived and the purpose of this article is to summarise the various competitions carried out during 1948. Limitations of space and the large number of different classes make it impossible to give details of prize-winning entries, but these are usually published locally. There are, however, many points which emerge from each competition and a study of the factors contributing toward success and the lessons to be learned from it are most important.

IT is the contributions to farming knowledge made by competitors which warrant the participation of local Instructors in Agriculture as judges at crop and pasture competitions and the presence of local farmers during judging. In the farming community of any province there are farmers whose ability in relation to certain phases of farming is outstanding and from whom all can learn. If these capable farmers can be induced to take a leading part in competitions, it is obvious that progress must follow as their knowledge becomes more widely publicised.

It is possible, too, that the competitor at the bottom of the judging list may contribute more to farming knowledge than one at the top; a preventable fault may have caused him to be placed last and a competent judge can point this out to farmers present at the judging, who will be able to avoid making the same mistake.

A review of district crop and pasture competitions follows.

Otago

In reviewing the competitions in Otago W. R. Lobb, Fields Instructor, Dunedin, gives some interesting sidelights on their development.

Pasture competitions were revived last season after a lapse of some years due to war conditions, the Milton branch of Federated Farmers holding a competition in November.

A review of the past work of competition committees and their history follows, and results of the latest competition will be given later in this article.

In their report on farmers' field competitions in 1936 the Otago committee made the following comment:—

"Despite the claims of other districts, Otago can rightly claim to be the home of farmers' field competitions in this country, for records reveal the fact that competitions were conducted in this province as early as 1895. In that year, Sir John Bennett Laws presented a 50 guinea challenge shield for the best-managed farm of from 100 to 400 acres in Otago or Southland. The competition was judged by Mr. P. Pattullo, Inspector for the New Zealand and Australian Land Company.

"In 1897 field turnip competitions were introduced, Joseph Fison and Company Ltd. offering two silver cups for competitions, one for the best 5-15 acres of turnips and the other for the best 16 acres or over of the same crop. Messrs. Donald Reid and Company also offered two cups, while other trophies were forthcoming from Messrs. Nimmo and Blair, Wright Stephenson and Company, and from the Otago Agricultural and Pastoral Society, who were sponsoring the movement.

"By 1901 these classes increased to eight, mainly for various crops, principally swedes, turnips, and mangolds.

"An interesting class introduced the first year (1895) was a reaper and binder trial held at Outram, which attracted three competitors. These three entrants were manufacturers of machines and as it was apparently not the intention of the Otago Agricultural and Pastoral Society to encourage such competitors, the conditions were changed and the following year the competition was open only to farmers and no paid servant of any maker, or expert, was allowed to be with the machine. The competition attracted eleven entries.

"The various competitions as outlined were continued up until 1917, when possibly on account of international upheaval, they were discontinued. From the late twenties onward some were revived in Southland and in the early thirties in Otago. The enthusiasm became quite widespread throughout the territory and at the commencement of the Second World War the Otago Farmers' Field Competition Committee was a very active body. Well-patronised and widely-dispersed competitions were held, covering best-managed farms, ewe hoggets, pastures, turnips, swedes, and chou moellier. In the Otago area championship awards for pastures had been inaugurated and many cups and trophies were competed for."

Forced into Recess

In 1940, owing to the unsettled conditions, the Otago Farmers' Field Competition Committee was reluctantly forced into recess and championship competitions were curtailed. It was left to district committees to decide on the type and extent of competitions they wished to conduct. It was realised that these competitions were of great value in increasing production and that it was not desirable to cancel them, because some districts might consider that they were still able to carry on. During the war most fixtures were cancelled, but root crop competitions were held in South Otago and, with one or two breaks, in Southland.

Apart from the competitive aspect alone, competitions have considerable value. It can be assumed that the winning entrant has used the best practices to achieve his success, and information gained over a number of years from the winning entries can show what are the best management practices. The information which is given out about the methods of successful entrants can then be regarded as valuable. From competitions it is possible to determine the best times to plough, the cultivation methods to be used, the most suitable dates and rates of sowing, the best pasture mixtures, the best varieties to sow, the manuring, liming, and topdressing necessary, and the most efficient general management methods for various crops in different districts. Competitions also give information on when various practices were widely adopted or when they ceased to be favoured. Dates at which new varieties of plants were introduced can also be assessed.

CROP AND PASTURE COMPETITIONS . . .

Extracts from Judges' Comments

The following extracts from various judges' reports on crop competitions will show how interesting and valuable items can be gained from farm competitions:—

Southland turnip and swede competitions, 1935: "Another feature that was quite noticeable was the prevalence of the condition known as 'mottled heart,' seen on cutting. This condition, known in Canada as 'brown heart', was there remedied to a great extent by applying boron compounds at the rate of a few pounds per acre with the fertiliser employed. This disease did not appear to be confined to any particular variety, as in the judged crops the following were represented: Masterpiece, Elephant, Superlative, Tipperary, Crimson King, Grandmaster, Knockdon, and Sutton's Perfection."

The use of boron on swede areas is a well-established practice in Southland today.

Another extract from the same report throws enlightenment on a point which has caused much discussion since the introduction of New Zealand grown turnip and swede seeds; the opinion was given before such seeds were on the market: "A complaint, frequently voiced by the farmers we met in our travels, was the great falling off these last few years in the yield of yellow turnips, and it would appear that this has been an important factor in recent years in the consequent falling off of entries in this particular section of the competition."

Southland competition, 1936: ". . . It is of interest also to record that a 24in. ridger was encountered for the first time in these competitions."

A practice not encountered today, but which must have been employed frequently in the past is revealed by the fact that among the winning entries about this time many had been saddle harrowed.

Strath Taieri district competition, 1936: "The average yield following double ploughing was 55 tons per acre, following early ploughing 41 tons 4cwt., and following late ploughing 40 tons 3cwt."

Sowing dates are somewhat unusual in this district, as the following statement in the report shows: "Four crops were sown in September, giving an average yield of 52 tons 1cwt. per acre; 7 were sown in October, with an average yield of 40 tons 8cwt.; while 5 were sown in November, with an average yield of 40 tons 12cwt."

A note on disease, typical of the information gained and passed on by competitions, reads: "Crops were relatively free from disease. A number of crops had second growth on the roots which is frequently confused with club-root, but which is a common occurrence in some seasons. Club-root and dry rot were both present in various crops, while some were affected with mottled heart. The incidence of this latter disease appeared to be confined to the river flats, although all river flat crops were not affected. It would appear to be rather significant that no mottled heart was observed on the terrace country away from the river. Those crops on the river flats following lea were free from mottled heart, whereas those on similar country following turnips were affected. The worst infection of this disease was on a crop following two previous swede crops. The worst infection of club-root was also in a second succeeding crop of turnips. Dry rot, however, was noticeable throughout various crops, and as this disease is seed borne, it is not surprising that it was found at random. A rather significant factor was the freedom from disease in those crops following lea."

Milton district swede competition, 1936: Yields in relation to months of ploughing were given as follows:—

Month		No. of crops	Yield (average) ton	cwt.
May	..	2	46	12
June	..	2	45	1
July	..	3	42	8

Stirling competition, 1936: "Eight crops followed lea; yields ranged from 64 tons 10cwt. to 90 tons 11cwt. and averaged 74 tons 1cwt. Four crops followed potatoes, the yields ranging from 74 tons 16cwt. to 95 tons 16cwt. and averaging 86 tons 7 cwt.

In 1943 the judges encountered New Zealand-produced seed and reported ". . . and the outstanding fact was the excellent germination. The purity of these lines was satisfactory."

In 1944 New Zealand seed of both turnips and swedes occupied the winning places in the competitions.

It is comments such as these and information passed on at judging and by the Press that add to the value of competitions.

Pasture competitions: Extracts from reports on these competitions have mainly the same valuable features as the extracts already given in regard to crop competitions. A 1936 report sums up the position in regard to *Poa annua*: "This grass, during the spring, gives a fair amount of very palatable feed, but cannot be regarded as a very good grass on account of its very short life. It is essentially, at the most, an annual. Under favourable circumstances it will flower and reseed several times in the 12 months, and is found most frequently filling in gaps in open swards of high fertility and in odd waste corners of the farms where bare patches are common, such as gateways and yards."

A report on Central Otago pastures makes these points: "The three most striking features seen are: 1. The large amount of *Poa pratensis* in the Galloway district. This grass is quite correctly regarded in many districts as being an inferior grass, but in the pastures at Galloway it is undoubtedly producing a very large amount of feed at the present time, and in judging the pastures it was necessary to regard it amongst the good grasses. One instance was seen where the recovery after cutting 10 days previously amounted to some 6 or 8in., and it is doubtful whether ryegrass would have made much more growth in that time. Nevertheless, when viewed broadly, *Poa pratensis* must be regarded as a fairly-poor grass, on account of its very twitchy and aggressive nature. This is seen repeatedly in lucerne stands where the grass has to a very large extent pushed out the lucerne. 2. The clover content of the pastures under irrigation is excellent and, if this were more general in other districts, there is no doubt that their pastures would be considerably improved. 3. Timothy. This grass under irrigation appears to be giving excellent results. It is a very palatable and nutritious grass and with cocksfoot it provides some very useful feed after the ryegrass has passed its best."

Of a pasture in the Waikouaiti district the judge comments: "This particular pasture is interesting in that it affords an excellent example of the effect that continuous hay crops have on various species. Cocksfoot thrives under these conditions to such an extent that it smothers out certain plants. This fact, coupled with the probability that a short-lived strain of ryegrass was sown, has resulted in the virtual complete elimination of the ryegrass. Under these conditions red clover or cowgrass will hold for many years, partly due to the lack of heavy summer grazing and partly due to light reseeding if the crop is cut late in the season. As mentioned before, white clover under these conditions does not thrive to the extent that it does when under continuous grazing."

If the comments of judges on competitions were compiled, they would make a handbook on agriculture.

Milton Competition

After the recent Milton competition the judges stated that, throughout, pastures reflected credit on the district and the majority were of a high standard. The general pastoral practices of the district can be summarised from the following information gained by the judges during their inspections:—

Of the pastures entered for competition 85 per cent. were sown with Certified seeds. Seventy per cent. of the pastures were sown with complex mixtures, the remaining 30 per cent. being ryegrass-white clover paddocks. The complex mixtures used were somewhat similar, the most common grasses included, other than perennial ryegrass, being cocksfoot, timothy, and Italian ryegrass. The clovers included in mixtures other than white clover, which was present in all, were Montgomery red clover and, in two or three entries, alsike. Rape was the most frequently-used nurse crop; some pastures were sown down with oats and others with wheat. In several cases no cover crop was employed.

With the exception of 4 entries for which the information was not available, all pastures had received lime, the amounts applied during the life of the pasture varying from 1 to 4 tons per acre. It would appear that in pastures up to 8 years old the usual amount applied in the district is between 2 and 3 tons per acre.

It is obvious that the general practice is to sow the seed mixture with 2cwt. of manure and, where a nurse crop is used, this is to be expected and is no doubt good practice.

Twenty-six of the entries had been topdressed subsequent to the initial application of manure, mainly with straight superphosphate. Information was not available in 4 cases. One instance of the use of cobaltised superphosphate was recorded. The general application of topdressing seemed to be

1 to 2cwt. of superphosphate per acre every year or every second year, though in some cases applications were made at longer intervals and in others the rate of application was heavier, up to 5cwt. being applied. Suckling clover, Yorkshire fog, and *Poa trivialis* were prominent in pastures which were not topdressed.

The most common undesirable grasses seen were Yorkshire fog, *Poa annua*, sweet vernal, browntop, and chewings fescue. *Poa trivialis* was present on land which should have supported pastures which would exclude it from the sward. Suckling clover was a constituent of swards where its presence could be deemed undesirable. The common weeds were flat weeds of many species, chickweeds, thistles, docks, and yarrow; a smaller quantity of many other weeds was present.

The judges felt that the competition could be even more valuable if pastures were judged in spring and autumn, and that if this were done, some alteration in the minor placings, at least, could no doubt be expected.

Southland

A crop competition limited to swedes and chou moellier is conducted annually by the Southland Agricultural and Pastoral Association in conjunction with the Department of Agriculture. There are two judges, one from the association and one from the Department. The winning crop of swedes in the 1948 competitions yielded 77 tons per acre, the best chou moellier area 64 tons per acre. An important point commented on by the judges was the seeding rate for chou moellier, which varied from 1lb. to 3lb. per acre. Three pounds per acre was considered definitely too heavy. The old controversy about the respective value of thick and thin stalks again arose during the competition, but it was found that there was little difference in weight between a thinned crop (thick stalks) and a thick crop (thin stalks). The latter seem to be more desirable for sheep feed.

The judges were given the opportunity once again to point out the effects of boron deficiency, as 2 of the heaviest crops of swedes weighed lost a considerable number of points for quality through the incidence of brown heart in the crop. The chou moellier crops were all of good quality.

Canterbury

Pasture competitions have been held during the past few years in several districts in Canterbury, the 1948 Ashburton competition being described in the July issue of the "Journal."

In the Rangiora district lucerne and field crops and pasture competitions are held. The Sheffield Agricultural and Pastoral Association conducts a competition for greenfeed, turnips, and pastures, while Federated Farmers branches at Hororata and Ellesmere-Dunsandel organise pasture competitions.

Nelson

Field competitions have been featured by both the Nelson and Motueka Agricultural and Pastoral Associations for a number of years as part of the annual show competitions. Entries have included areas of lucerne, cowgrass, or cowgrass and ryegrass for hay and permanent pasture. Judging has been done by the local Instructor in Agriculture and endeavours have been made to combine judging with a farmers' field day. It is considered that pasture competitions in particular have helped to some degree in the improvement of the district's grassland.

A crop of chou moellier. An important point commented on by the judges in the Southland competitions was the seeding rate of the chou moellier crops judged, which ranged from 1lb. to 3lb. per acre. The latter rate was considered definitely too heavy.

South Taranaki

In co-operation with local branches of Federated Farmers competitions including those for hay, silage, and pastures were conducted in the Hawera district. Field days at which there was a good attendance of farmers were held on each judging day and the time spent was considered well worth while by those participating, as opportunity was taken to view outstanding features on all farms visited.

Mid-Taranaki

Pasture competitions were conducted in the Wharehuia, Pukengahu, and Strathmore districts. Hay and silage competitions are included in the Strathmore competition, which was maintained throughout the war years. Hay and silage are also judged in the Tarata district. A number of factors operate against the making of good-quality hay and silage in Central Taranaki: High rainfall and unsettled weather are generally experienced before Christmas, and by January ryegrass and white clover are overmature. On broken country farmers are compelled to cut the same paddock year after year. Moreover, because of labour shortage haymaking is done in gangs and this system of harvesting tends to give a product which is not of the best quality. No extra topdressing is possible on the hay and silage paddocks and the transfer of fertility by feeding out in other paddocks results in the gradual elimination of perennial ryegrass and white clover from the hay paddocks.

North Taranaki

Field competitions were revived on a district basis in North Taranaki in 1946, when pasture competitions were held. In the 1947-48 season crop, hay, and silage competitions were also revived. The 1947-48 competitions drew 314 entries in the pasture section, 34 in the crop section, 64 in the hay section, and 28 in the silage section. The judges' report indicates that the winning entries in all pasture, hay, and silage competitions were of a very high standard, but crop yields were not as high as those of many winning entries in previous years.

Most of the hay inspected had been harvested and stacked in good condition and only a small proportion had been affected by rain. It was noticeable that most of the best stacks were round and it appears that unless there is a big gang on the stack, an oblong stack is more difficult to construct than a round one and therefore is more likely to let in water. On the whole the silage was very good. The dry spell experienced in the previous November appeared to have been responsible for much of the silage being slightly darker than usual and some to be very black even when the material was cut at a leafy stage.

Auckland

Competitions in the Auckland district are confined to those conducted by Mauku Federated Farmers and in addition to a pasture, hay, and silage competition, include one for the best-kept farm. The judges consider that the best-kept farm competition is extremely valuable, as it provides a wealth of evidence of what can be accomplished on the average farm. It has revealed that by thought, care, and planning the gardens and general surroundings of the homesteads of farms entered in the best-kept farm competition have been brought up to a

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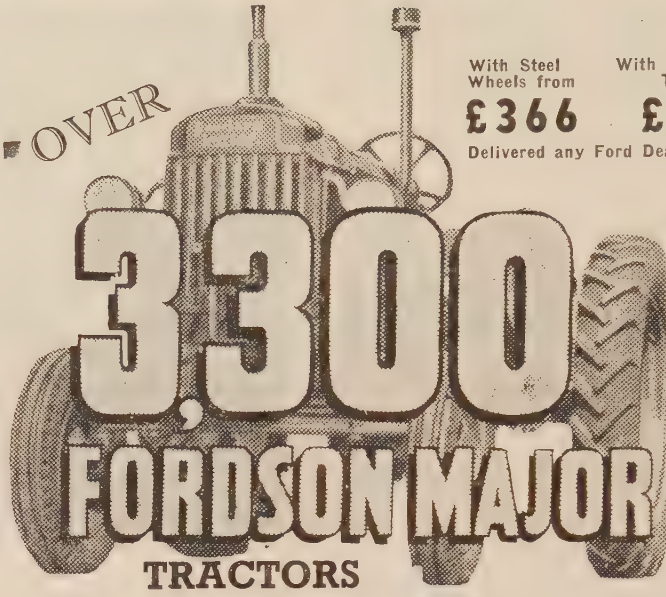

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standard which should be aimed at by other farmers. Other features of farms in the competition were the excellence of the water supply and reticulation, farm shelter, and the condition of stock, which indicated they were well fed. On every farm the supplementary feed position was well above average. There were also good supplies of hay, silage, and winter-saved grass and in some cases swedes and autumn-sown cereals. The housing of farm implements was generally good.

Matamata

One swede and one hay competition were completed in the Matamata district in 1948. In the swede competition the main features were the early sowing and the short period between ploughing and sowing. On this pumice land—Taupo sandy silt—a long fallow results in the small amount of humus in the soil being leached, leaving a layer of almost pure sand on top in which moisture needed for germination is lacking. Another feature was the success of a swede crop when sown with a permanent grass mixture; many farmers are now using this method of grassing down, with good results.

Rotorua

In 1947-48 field crop, hay, and silage classes of the farmers' field competitions conducted by the Rotorua, Ngakuru, and Reporoa branches of Federated Farmers there was a slight increase in entries compared with the previous season's competitions. (An account of the 1946-47 competitions appeared in the March, 1948, issue of the "Journal.") A pleasing feature of the 1948 season's competitions was the almost general improvement in all classes. There was evidence that more care had been taken in making meadow hay, lucerne hay, and silage and as a result the quality was better.

The incidence of brown heart in swede entries, so noticeable in the previous season, was confined to only a very few crops and in these the disease was not particularly bad, except in two cases where no borax had been used. The highest yield in the swede competitions was 80 tons per acre.

C. R. Taylor, Instructor in Agriculture, Rotorua, makes the following comments on the competitions:—

Swedes

In discussing the results of the 1946-47 season competitions in the March, 1948, issue of the "Journal" reference was made to the fact that no safe conclusions could be drawn from only one year's competitions. Similarly it would be inadvisable to be too dogmatic in assessing results after two years of contests, but since certain features in respect of swede growing noted in 1946-47 recurred during the 1947-48 season, they are probably of more than passing interest.

The winning stack of meadow hay in the Rotorua-Ngongotaha district. Features of the stack are the good covering and the manner in which it is protected from stock.

Seed: Crimson King variety again took first and second places in all three districts (Rotorua, Ngakuru, and Reporoa) and one third place, while Grandmaster and Superlative each took one third place. Thus out of 9 possible places Crimson King secured 7, against 6 for 1946-47. This performance would at least suggest that the variety possesses certain characteristics which adapt it particularly well to pumice-country conditions. Crimson King, sown pure, was the seed used in 15 of the total of 30 entries—50 per cent. of them, compared with 25 per cent. the previous season. New Zealand Resistant and Sensation were other varieties represented, but neither of them nor Superlative nor Grandmaster featured prominently in any of the district competitions.

As was the case in 1946-47 most entrants used 1lb. of seed per acre. There is some evidence that, given satisfactory germination conditions, not more than 1lb. per acre should be sown (broadcast or in narrow drills) if a crop of good-sized bulbs is desired. In the 2 years competitions have been held it has been noticed that heavier seeding rates have produced a large number of small roots which give a tonnage per acre less than that of fewer but larger bulbs. Moreover, with thick crops of small roots it was noticed that diseases, especially dry rot, tended to be more prevalent.

Method of sowing: Of the 30 swede entries 16 were sown with the drill and 14 were broadcast, using the ordinary topdresser. Most drilled crops were sown through every second coulter, but one was sown in 24in. rows through a manually-operated cultivator with sowing attachment. Except where the seed was sown by cultivator, seed and fertiliser were mixed before sowing. There was no significant difference between the crop where seed was sown separately and the others.

Fertiliser: All placed entries were manured either with superphosphate or serpentine superphosphate (chiefly with superphosphate), the quantities ranging from 1¾cwt. to 3½cwt. per acre and the average being about 2¾cwt. The majority of entrants used straight superphosphate at the rate of approximately 3cwt. per acre. Only 2 entrants used lime (1cwt. per acre) in addition to fertiliser. Potash, in amounts varying from 20lb. to 112lb. per acre, in conjunction with a phosphatic fertiliser, was employed by 4 competitors. This additional manure apparently did not help to produce better crops, which confirmed the experience of the previous year.

Cultivation: All but 1 of the 30 entries were ploughed out of grass to a depth of 4 to 6in. The exception was an area which was disced (several times) from grass and, incidentally, it produced an excellent crop of sound roots. For some reason there appeared to be a tendency this year for ploughing in relation to sowing to be earlier. In 1946-47 most of the competitors ploughed early in November and sowed in the same month, securing excellent results. This year an equally substantial number ploughed during late October and early November, but did not sow until early December. It seems probable that the intention was to sow sometime in November, but the weather at that time was unfavourable. Whatever the reason for earlier ploughing, it was clear that, generally, the best crops were those sown on land that had been ploughed not many weeks before sowing. In fact among the placed crops was one which, within a week, had been ploughed from grass, worked to a seed-bed, and sown.

Except for 2 entries which were sown between mid-October and late October (September ploughing), all were sown between late November and early December.

As in the 1946-47 season, the areas entered last season had been given the customary 2 or 3 cuts with discs, followed by a stroke or two with tripod and chain harrows. In a few cases competitors also used tine harrows. Only 8 of the 30 entries were rolled, either before, or immediately after sowing. Of the 9 placed entries only 3 were rolled to consolidate the seed-bed. Reporoa competitors were the only ones to roll their land before sowing. It would appear, therefore, from 2 years' results that under Rotorua conditions rolling is not absolutely essential to the success of a swede crop.

Disease: Contrary to the previous season's experience, most entrants this year used varying quantities of borax to control mottled (brown) heart disease and almost without exception satisfactory to excellent control was gained; but it was noticeable (except in two instances where the organic-matter content of the soil was abnormally high for pumice country) that where no borax, or very little of it, was used the disease was relatively severe.

Whereas the majority of competitors failed to use borax in 1946-47 for the control of mottled-heart disease, mainly with disastrous results, this season 21 entrants used between 4lb. and 20lb. per acre, the average being about 9lb.

Dry rot disease was present in many of the entries, but to such a minor extent that it caused very little loss. There was no evidence of soft rot or other serious infection.

Records: Most competitors scored fairly well in this section and thus contributed materially to the preparation of this survey; but there is still room for some improvement if the full purpose of the competition is to be achieved.

Meadow Hay (Stacked and Baled)

There was a most pleasing improvement in general quality of meadow hay and in the manner in which it was protected from stock and weather, compared with the position in 1946-47. Generally the herbage was cut in a much more leafy condition and also contained a higher proportion of clovers and trefoil. Inferior grasses such as sweet vernal, goosegrass, and hairgrass were not nearly so prominent and there was a considerable improvement in the ryegrass and cocksfoot content. All first-place entries were of an exceptionally-high standard—a standard well worthy of emulation in the future. In fact, most of the placed entries consisted of really good hay. No material difference in quality could be detected between well-made stacked hay and well-made baled hay.

Lucerne Hay

The lucerne hay class showed some improvement over the previous season's competition, both as regards the number of entries and quality. Results showed, however, that there was ample scope for further improvement in this important winter supplement. Greater care should be taken in harvesting the crop to see that as little leaf as possible is dropped. It appears that usually lucerne is left far too long in the swath before being windrowed and possibly cocked. The result is a rapid loss of leaf, due to heat from the sun, and the ultimate saving of bare stems only.

Most entrants lost points either through faulty harvesting methods, or failure to protect stacks adequately against bad weather. Lack of experience with lucerne was largely responsible for the faults mentioned.

Silage

The entries (10) received in the silage section showed a distinct improvement over those entered in 1946-47, which was very encouraging, especially in view of the fact that the Rotorua district has never been regarded as an important silage-making area.

The 1947-48 competition proved conclusively that silage of the highest quality can be made by farmers in the Rotorua district. If a few farmers can make silage satisfactorily, no doubt all farmers, with experience, could do likewise.

Silage making should be particularly attractive to farmers whose properties are fully developed and in first-class pasture, as not only does it lend itself to pasture management of a high order, but it can also obviate the need for breaking up good pastures for annual cropping.

DAIRY PRODUCE GRADED FOR EXPORT

THE following figures showing quantities of dairy produce graded for export during June and for the 11 months ended June 30, 1949, with comparative figures for the same month and 11-monthly period of last year, have been compiled by the Dairy Division of the Department of Agriculture from figures supplied by divisional officers at the various grading ports:—

BUTTER—

		Tons		Tons	
Period	Creamery	Whey	Total	Percentage inc. or dec.	Total in store at end of mth.
June, 1949	1,053	28	1,081	+102.434	13,698
June, 1948	519	15	534	—	14,673
Increase or decrease	+534	+13	+547	—	—975
For 11 months ended 30/6/49	142,182	2,633	144,815	+10.870	—
For 11 months ended 30/6/48	128,282	2,334	130,616	—	—
Increase or decrease	+13,900	+299	+14,199	—	—

CHEESE—

		Tons		Tons	
Period	White	Coloured	Total	Percentage inc. or dec.	Total in store at end of mth.
June, 1949	1,346	110	1,456	+43.166	11,653
June, 1948	1,017	—	1,017	—	5,629
Increase or decrease	+329	+110	+439	—	+6,024
For 11 months ended 30/6/49	89,438	5,163	94,601	+14.481	—
For 11 months ended 30/6/48	82,634	—	82,634	—	—
Increase or decrease	+6,804	+5,163	+11,967	—	—

If these figures are converted into butterfat equivalent, there is an increase of 11.683 per cent. in butterfat graded for the 11 months as compared with the corresponding period of the preceding season. It should be noted that the above figures refer only to butter and cheese graded for export, and that owing to diversions which may take place from time to time, they are not necessarily a true indication of production trends.

SEED MAIZE

FOR several years the Department of Agriculture has been interested in the results being obtained from the use of hybrid types of seed maize and three seasons ago the Department grew an experimental area for the production of seed of a genuine double hybrid —Pfister No. 360.

Imported seed of this hybrid had already behaved very well under local conditions and, as a result of the information gained from the experimental area in the 1946-47 season, an area for the production of hybrid seed on a commercial scale was sown the following season. Unfortunately the total produce of this area was lost in the disastrous flood experienced in the Gisborne district in 1948, but a further area was sown out for the 1948-49 season. This area has now been safely harvested and at present the produce is in crib preparatory to threshing and machine dressing.

The resultant seed will be distributed by the Department as "Certified Pfister Double Hybrid No. 360" in time for the coming spring sowings.

Orders for this seed, which will be accepted only from those firms usually engaged in the supply of seed maize, should be placed with the Instructor in Agriculture, Department of Agriculture, Box 29, Gisborne. Farmers desiring to obtain supplies of this New Zealand-grown seed should make arrangements with their local merchants.

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Radio Broadcasts

RADIO talks to farmers will be given from Station 1YA Auckland at 7.15 p.m. on the following dates:—

September 7—"Current Farming Problems for the Month," by J. E. Davies, Fields Instructor, Department of Agriculture, Hamilton, and G. A. Blake, Fields Instructor, Department of Agriculture, Matamata.

September 14—"Improvement of Hill-country Pastures," by S. H. Saxby, Agrostologist, Department of Agriculture, Wellington.

September 21—"Irrigation and Soil Moisture," by H. E. Annett, Soil Fertility Research Station, Hamilton.

September 28—Young Farmers' Clubs' session, by a member of the Eastern Bay of Plenty District Committee.

The following broadcasts will be made from 4YA Dunedin after the stock session at 7 p.m. on the dates shown:—

September 7—"Spring Planting of Vegetables," by W. G. Crawford, Vegetable Instructor, Department of Agriculture, Dunedin.

September 21—"Development of Browntop Country," by J. G. Richards, Instructor in Agriculture, Department of Agriculture, Balclutha.

Other talks are given from 1YA Auckland on Tuesdays at 12.35 p.m., 2YZ Napier on Thursdays at 12.40 p.m., 2YA Wellington on Thursdays at 12.35 p.m., and 3YA Christchurch on Mondays at 12.20 p.m.

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Left-over Meats

THOUGH the cooking of meat should be planned to avoid having any left over, achieving that end is not always possible. Left-over meat can be most uninteresting, yet in the interests of economy it cannot be wasted. This article by Edith G. McNab, Rural Sociologist, Department of Agriculture, Dunedin, offers ideas for making appetising left-over meat dishes.

It is important not to cook left-over meat again, for such treatment will tend to toughen its protein. The preparation of such foods should be timed so that the meat is just heated through at serving time. The meat may be cut up or minced and mixed with other ingredients such as vegetables, cereals, eggs, and milk; it may be moistened with stock or gravy and enclosed in layers of potato, pastry, rice (when available), or a scone mixture; or it may be simply reheated in a gravy or sauce. Left-over meat dishes need not always be hot; the meat may be cubed and used in salads, it may be set in a savoury jelly, and it may be used for sandwiches. In all cases the seasoning must be given careful consideration to bring out but not overwhelm the flavour of the meat. When prepared in ways which ensure high palatability and served attractively, left-over meat dishes will be welcomed by the family rather than be recognised as part of a previous day's meal.

APPETISING WAYS OF SERVING

Meat Roll

1 medium-sized onion, minced or cut up and browned in a little fat to develop extra flavour
About 1lb. of cooked meat, minced
Salt and pepper

Mix the ingredients with a little gravy or stock, but do not make them too moist. Spread the mixture on a rectangle of scone dough rolled to ¼in. thick, roll it up, and bake it in a hot oven (400 degrees F.) for about ½ hour. If desired, the roll can be cut into about 6 slices before being cooked and baked as meat pinwheels. Serve the roll with a good brown gravy, to which a few drops of Worcestershire sauce may be added, or tomato sauce.

Scone Mixture:

2 cups (8oz.) of sifted flour
4 level teaspoons of baking powder
About 2/3 cup of milk
½ level teaspoon of salt
2 tablespoons of shortening

Rub the fat into the dry ingredients and mix them to a soft dough with the milk.

Tomato Sauce:

3 level tablespoons of fat (butter when available)
3 level tablespoons of flour
¾ level teaspoon of salt
⅛ teaspoon of pepper
1½ cups of tomato puree or juice

Cook the flour in the fat without browning it. Add the liquid, a little at a time, stirring until it is smooth after each addition. Bring the sauce to the boil and add the seasonings.

Creamed Meat

2 cups of diced cooked meat
4 level tablespoons of fat
4 level tablespoons of flour
1 teaspoon of salt
⅛ teaspoon of pepper
2 cups of milk or part milk and part meat stock

Make the sauce as directed for tomato sauce, add the meat to the hot sauce, and reheat it thoroughly. The reheating may be done over hot water. More salt and pepper may be added as required, and for beef or mutton 2 teaspoons of Worcestershire sauce. Serve creamed meat with vegetables or on buttered toast or fried bread.

Meat shortcakes: Make scones using half the scone recipe given for meat roll. Pour some of the creamed meat over the bottom halves of the hot buttered scones, replace the tops of the scones, and top them with the remaining creamed meat. Some of the meat may be replaced with hard-boiled eggs or cooked green peas. A little cooked celery or onion may be added if desired.

Chicken or rabbit patties: Roll puff pastry about ¼in. thick. Cut it into rounds and cut the centres out of half the rounds with a small cutter. Wet the tops of the cut-out rounds with cold water and place one of the other rounds on each. When they are cooked fill them with hot creamed chicken or rabbit and top them with the cut-out centres, cooked separately. For parties, small patty cases can be made, filled previously, and reheated just before serving time.

HEADING PHOTOGRAPH: **Meat roll with tomato sauce.** *Sparrow Industrial Pictures Ltd. photo.*

Stuffed Marrow
Meat and Vegetable Mould

Bacon Olives

[*Photographs above and on opposite page by Sparrow Industrial Pictures Ltd.*

Meat Croquettes

4 level tablespoons of fat
4 level tablespoons of flour
1 cup of milk or meat stock
2 cups of cooked meat, minced
1 teaspoon of finely-chopped onion
1 teaspoon of finely-chopped parsley
1 teaspoon of ketchup or a few drops of Worcestershire sauce
Salt and pepper

Make the fat, flour, and milk or stock, with ½ level teaspoon of salt and ⅛ teaspoon of pepper, into a thick sauce, using the method given for tomato sauce. Mix the other ingredients with the sauce, varying the seasonings as desired and according to the meat being used. Cool the mixture and shape it into cylinders or balls. Roll them in dried breadcrumbs, then in egg (1 egg slightly beaten and mixed with 1 tablespoon of milk or water), and in breadcrumbs again. Fry them in deep fat. (The temperature of the fat is correct when a small cube of white bread browns in it in 40 seconds.) Drain the croquettes and serve them hot.

Cornish Pasties

10oz. of flour
5oz. of fat
10oz. of diced cooked vegetables, including some onion
6oz. of diced cooked meat
2 teaspoons of salt
½ teaspoon of nutmeg if liked
¼ to ½ cup of stock for moistening
2 teaspoons of Worcestershire sauce
Chopped parsley and herbs if desired

Make pastry from the flour, fat, and ½ teaspoon of salt, roll it out, and use a saucer to cut large rounds. Put the filling (composed of the other ingredients) in the centre, bring up both sides of the pastry, and join the edges at the centre. Bake the pasties at 400 degrees F. for about 20 minutes.

When time presses, instead of making individual pasties line a greased pan with half the pastry, cover it with the filling, and top it with the remaining pastry. Mark it into servings and bake it. Serve it with a good brown gravy, well seasoned, or tomato sauce.

Curry

3 tablespoons of flour
1 medium-sized onion, chopped
1 small apple, sliced
1 teaspoon of curry powder
3 tablespoons of fat
Salt and pepper
2 cups of stock
2 cups of diced cooked meat

Brown the onion in the fat, add the curry, seasonings, and flour, and cook them for a moment longer. Add the stock gradually, stirring until the mixture is thickened. Add the sliced apple, and when it is cooked add the meat and heat the curry thoroughly.

Stuffed Marrow

1 small marrow
1 cup of minced meat
1 medium-sized onion, chopped and browned in a little fat
1 cup of cooked mixed vegetables
1 cup of soft breadcrumbs
2 teaspoons of salt
⅛ teaspoon of pepper
½ teaspoon of nutmeg
¼ teaspoon of herbs if liked

Cut the top off the marrow and scoop out the centre. Mix all the ingredients together, put them in the marrow, and replace the cap. The skin may be left on or not, as desired, but if it is left on, cooking will take longer. Bake the marrow at 350 degrees F. for 1 to 1½ hours.

Mince Surprise

1lb. of cooked meat, minced
1 small onion, very finely grated or chopped
Salt and pepper
¾ cup of stock or tomato juice
1 egg, slightly beaten

Mix all the ingredients together. Line greased individual moulds with mashed potato, which must not be too moist, and fill them with the meat mixture. Steam them for ½ hour and turn them out. When rice is available it may be used instead of potato.

Meat Souffle

4 level tablespoons of fat
4 level tablespoons of flour
1 cup of milk
2 eggs
1½ cups of minced cooked meat

Make a thick sauce of the fat, flour, and milk. Mix in the beaten egg yolks and meat. Season the mixture with salt and pepper. Beat the egg whites stiffly and fold them into the sauce mixture. Put the souffle in a greased dish, stand it in a pan of water, and bake it for ¾ to 1 hour at 350 degrees F. Serve it at once, garnished with a small sprig of parsley.

Bacon Olives

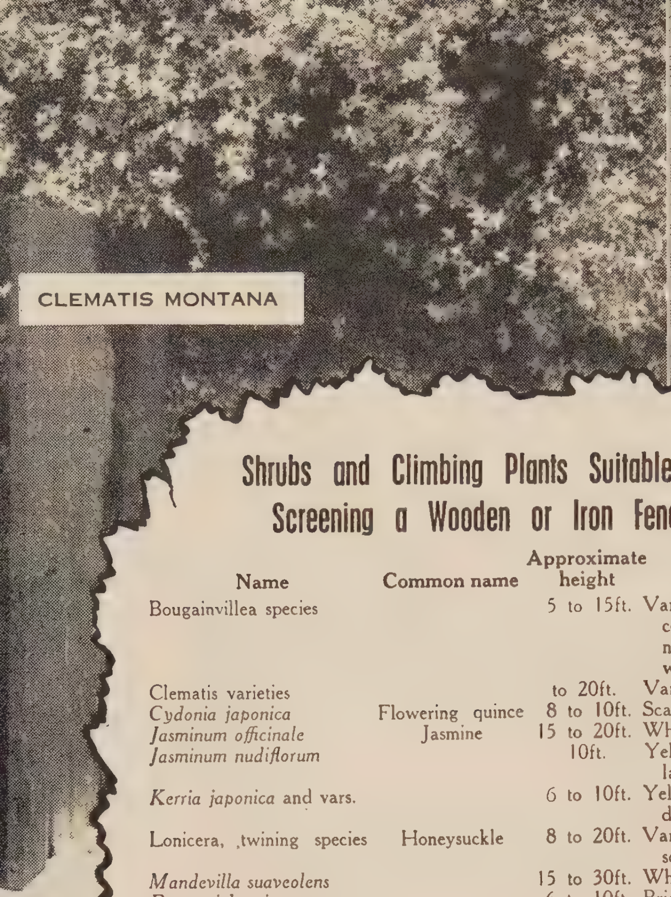
Remove the rind from thin slices of bacon. Place dessertspoonfuls of well-seasoned, cooked, minced meat on pieces of bacon and roll the bacon round them. Fix them on skewers or with a toothpick. Grill or bake them until the bacon is cooked and the meat heated through.

Mock Aspic (to jelly left-over meat for serving with salad)

1 tablespoon of gelatine
¾ cup of boiling water or stock
¼ teaspoon of salt
1 tablespoon of vinegar
1 tablespoon of sugar
⅛ teaspoon of pepper
2 tablespoons of lemon juice (if not available, increase the quantity of vinegar)

Soak the gelatine in ¼ cup of cold water and dissolve it in the hot water or stock. Add the remaining ingredients.

To produce an attractive mould, first set a thin layer of jelly on the bottom of a cake tin or mould, decorate it with slices of hard-cooked egg, tomato, or whatever is available, and add a little more jelly to fix them in position. When the jelly is set fill the mould with a mixture of cold, cooked, diced or minced meat, well seasoned, and the remainder of the cool but not set jelly. At serving time turn out the jelly by dipping the tin quickly in warm but not hot water and then inverting it. If desired, layers of the jellied meat can be set between layers of jellied vegetables such as cooked green peas or beetroot. Allow each layer to set before adding the next and have each fresh layer cooled but not quite setting before it is added.


CLEMATIS MONTANA

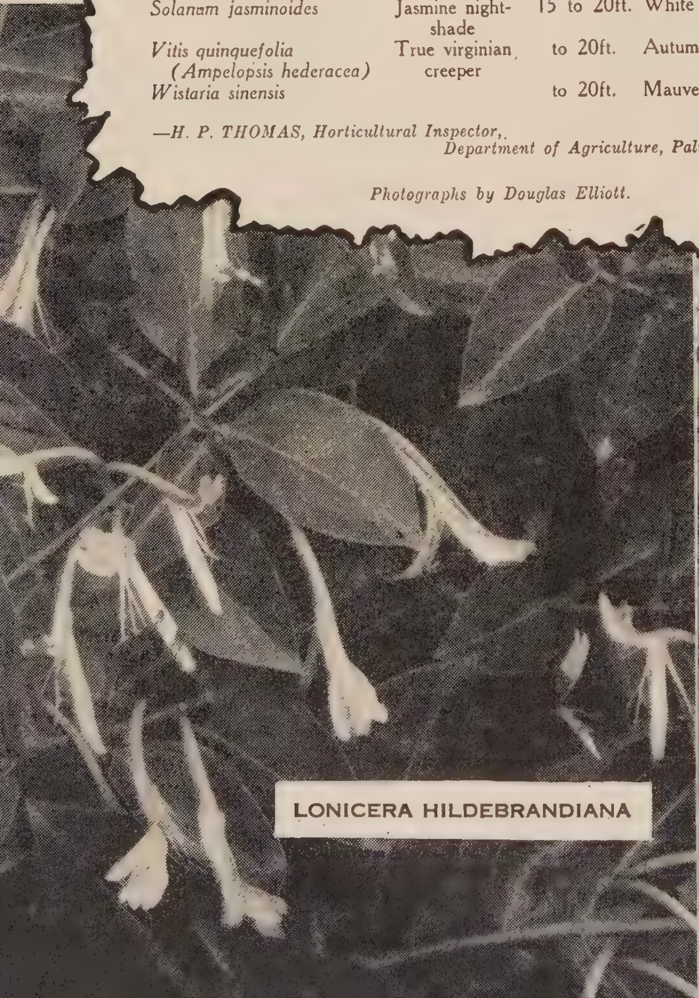
CYDONIA JAPONICA

Shrubs and Climbing Plants Suitable for Screening a Wooden or Iron Fence

Name	Common name	Approximate height	Colour
Bougainvillea species		5 to 15ft.	Various shades; rose coloured bracts; not hardy everywhere
Clematis varieties		to 20ft.	Various
Cydonia japonica	Flowering quince	8 to 10ft.	Scarlet to blood red
Jasminum officinale	Jasmine	15 to 20ft.	White
Jasminum nudiflorum		10ft.	Yellow; flowers in late winter
Kerria japonica and vars.		6 to 10ft.	Yellow; single and double
Lonicera, twining species	Honeysuckle	8 to 20ft.	Various; sweetly scented
Mandevilla suaveolens		15 to 30ft.	White; fragrant
Rosa wichuraiana var. (Pauls Scarlet Climber)		6 to 10ft.	Bright crimson; semi-double
Solanum jasminoides	Jasmine night-shade	15 to 20ft.	White
Vitis quinquefolia (Ampelopsis hederacea)	True virginian creeper	to 20ft.	Autumn foliage
Wistaria sinensis		to 20ft.	Mauve

—H. P. THOMAS, Horticultural Inspector,
Department of Agriculture, Palmerston North.

Photographs by Douglas Elliott.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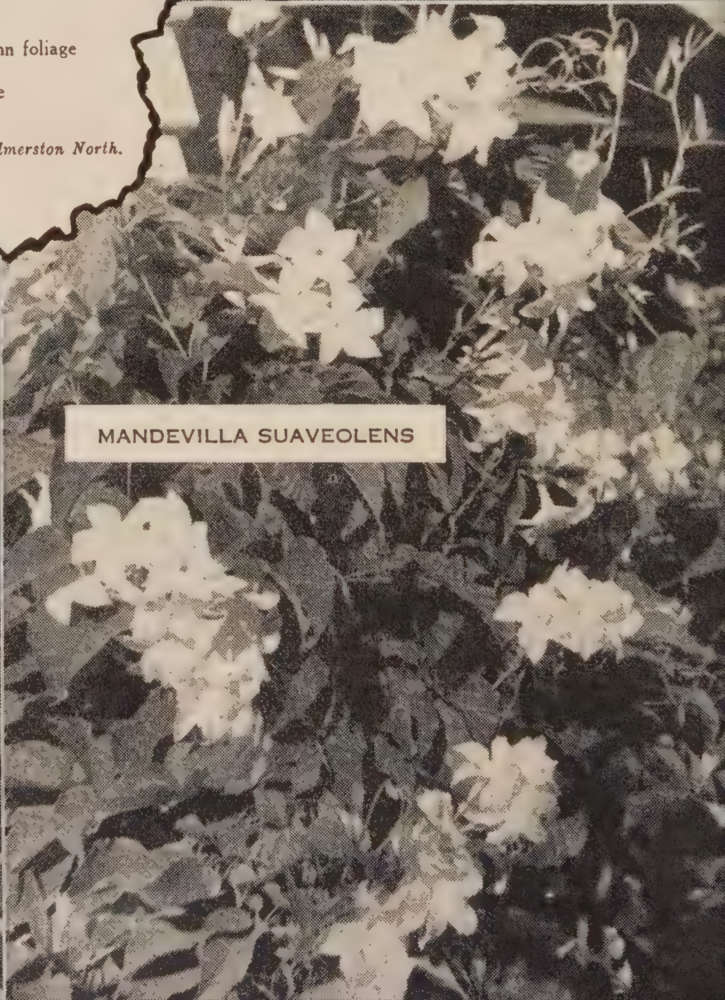

MANDEVILLA SUAVEOLENS

Annual Plants for the Flower Garden

WITH the advent of September in New Zealand definite signs of spring appear everywhere, the weather becomes warmer, and on every hand is evidence of plant life awakening from its winter sleep into vigorous growth. With these portents every gardener becomes imbued with the urge to be up and doing, to sow seeds and to raise plants for the approaching flowering season. The treatment of annual flowering plants is the main theme of this month's article for the flower gardener by M. J. Barnett, Director of Reserves to the Christchurch City Council.

[*Douglas Elliott photo.*

FOR creating colourful displays in the flower garden plants generally described as "annuals" are among the best. Literally, annuals are those plants which grow from seed, flower, and produce seed within 12 months and die after the seed has ripened. However, some few annuals may be induced to flower in the second season if all the seed heads are removed immediately the flowers have passed their full beauty, and many perennial plants, such as the antirrhinum, flower the first year from seed and are more often than not treated as annuals. There are also some plants, such as the lobelia, which are killed outright by frost and therefore are raised annually from seed, though it is possible to perpetuate them by cuttings from year to year. For the purpose of this article all plants that can be and are flowered from seed within 12 months will be treated as annuals.

Three Classes of Annuals

Annuals may be divided into three classes: First, the hardy annuals such as sweet peas, cornflower, and godetias which can be sown in the open ground and which will bloom within the same season; second, the half-hardy annuals such as French and African marigolds that generally require to be raised in heat under glass in the initial stages of their growth and then transplanted to the open ground after frosts are over and when the temperatures of the air and soil are higher and more conducive to their requirements; and, third, the tender annuals such as celosias which are usually grown from seed to flowering in a greenhouse, but which may be transplanted to open ground and flowered with success in districts where cool temperatures are not experienced during summer. Annuals may be used for many purposes in the flower garden. Such plants as petunias, salvias, verbenas, and *Phlox drummondi* are excellent for bedding purposes, either by themselves or in conjunction with other subjects; for instance, *Phlox drummondi* makes a colourful display in a bed by itself or it may be used with good effect as a groundwork in a bed of mixed dahlias. The display in the perennial or mixed flower border can be enhanced by planting or sowing annuals between and among the groups of perennial plants. As examples, a group of African marigold planted through or around a clump of oriental poppy will provide a continuity of bloom after the poppies have passed out of flower and developed that untidy appearance which they present during mid-summer and autumn; salmon-pink clarkia sown among a group of the tall, feathery *Thalictrum dipterocarpum* provides a pleasing contrast with the purple-mauve coloured flowers of the *Thalictrum*, which are carried well above the pink flowers of the clarkias.

A border devoted entirely to annuals can be made one of the dominant features of the flower garden during summer.

Many of the less exacting kinds, such as nasturtiums, petunias, and linarias, are excellent for covering up bare spaces that occur in front of a shrubbery. A number of annuals, such as sweet peas, the canary creeper (*Tropaeolum peregrinum*), nasturtiums (*Tropaeolum majus* and *T. minus*), and the several varieties of convolvulus and ipomeas, are also admirably adapted as climbers for covering trellis work or paling fences. The convolvulus and ipomeas, which have brilliant blue and pink flowers and succeed in a warm, sunny, sheltered position, must not be confused with that awful curse the white perennial "convolvulus," which is not a true convolvulus but *Calystegia sepium*.

Sowing Methods

Most of the hardy annuals may be sown in open ground during September. Some of them will succeed in relatively-poor soils, but the majority prefer a well-cultivated soil rich in organic matter. Practically all of them dislike being transplanted and grow much better when sown in the positions where they are to have their being and produce their flowers. Before they are sown the soil should be thoroughly moist—not sodden, wet, or sticky, but in that friable state where it can be broken up readily and reduced to a fine tilth with a garden fork and rake. However, the soil should not be reduced to a dust-fine state which is likely to cohere into a hard crust after the first good rain or to entice sparrows to make a dust bath in it. With the soil prepared, the seed can be sown either in shallow drills or broadcast. If the seed is broadcast, the surface requires to be lightly but efficiently raked over to ensure that it is buried. If the soil is inclined to be loose, it should be firmed with the back of a rake or spade. Provided the soil retains its moisture and the weather is not dry, the seed should germinate within 10 days or a fortnight. To prevent rapid evaporation of moisture from the surface in dry, sunny weather, light branches of birch, manuka, or similar material may be laid over the areas sown down, but these branches should be removed as soon as the seedling plants appear above ground. Shallow drills made with a sharpened stick or the tip of a trowel provide a surer

[Douglas Elliott photo.

Oriental poppies make a brave show when in bloom, but later they develop an untidy appearance. African marigolds planted among them provide a continuity of bloom.

method of sowing, as every seed sown can be adequately covered with soil. Whichever method is adopted, the seed should be sown thinly. Most of the hardy annuals require from 4 to 6in. in which to develop, and if the seed is sown too thickly, the plants must be thinned heavily and repeatedly to prevent overcrowding. All of the hardy annuals mentioned in the recommendations which follow may be sown to advantage in open ground.

Characteristics of Annuals

Acroclinium roseum has rose and white daisy-like flowers which are excellent for drying for winter use. Flowers required for such a purpose keep their colour better if picked in the fully-developed bud stage or just when the flowers are fully expanded. This precaution also applies to the other "everlastings" such as helichrysums, rhodanthes, and xeranthemum. The last-named has deep purple and rosy violet flowers.

Sweet alyssum forms neat little bushes not more than a few inches high and literally covered with white flowers. It remains more compact and much more charming in appearance when sown in a comparatively-poor and hard soil exposed to full light than it does when given a good soil and a semi-shaded position, where it grows more loosely and loses its true miniature character. Because of its neat, compact habit it makes an excellent edging plant for beds or borders. The variety Lilac Queen has become very popular for such a purpose of recent years.

Clarkias and larkspurs thrive best when sown in good soil and when well grown provide cut flowers admirably suited for vases and bowls. Godetias are also first favourites; there are two types, the tall-growing varieties with flowers produced in long, loose sprays very suitable for cut flowers, and the dwarfer varieties such as Sybil Sherwood which produce the flowers in clusters.

Other hardy annuals used extensively for cut flowers are nigella (love-in-a-mist), cornflower, sweet sultan, candytufts, and eschscholtzias, more familiarly known as jacky-go-to-beds or Californian poppies. In some localities the wild type of Californian poppy has become a pest on dry riverbeds and railway embankments, but several improved varieties with red, rich pink and rose-coloured semi-double flowers are well worth a place in the garden.

Mignonette will always be welcome in any garden for its sweet fragrance. It prefers a soil that is on the firm side and contains lime. One successful grower advocates giving the soil a dressing of lime before sowing the seed.

The night-scented stock (*Mathiola bicornis*) is another of the best scented flowers. During the day it has little to commend it—in fact, it looks very drab and inconspicuous—but on a calm evening it fills the air with its fragrance. A few patches of it scattered through the more outstanding subjects in the flower border repay anyone who enjoys a stroll through the garden when the heat of the day is over. The virginian stock, though only a miniature plant, is more colourful and will grow in almost any soil and situation.

Plants Recommended by the District Council of the Royal New Zealand Institute of Horticulture for Planting in the Wanganui District

Evergreen Native Trees

- Kowhai (*Sophora tetraptera*)
- Pohutukawa (*Metrosideros tomentosa*), coastal
- Ngaio (*Myoporum laetum*), coastal
- Totara (*Podocarpus totara*)
- Rata (*Metrosideros robusta*)
- Rewarewa (*Knightia excelsa*)
- Rimu (*Dacrydium cupressinum*)

Native Shrubs

- Kaka beak (*Clianthus puniceus*)
- *Senecio greyi*
- *Hebe speciosa*
- Kumarahou (*Pomaderris elliptica*)
- Manuka (*Leptospermum scoparium* var. *martini* and *keatleyi*)
- Ake ake (*Dodonaea viscosa*)
- Ramarama (*Myrtus bullata*)

Evergreen Exotic Trees

- *Eucalyptus ficifolia*, coastal
- *Eucalyptus leucoxylon rosea*
- *Banksia serrata*
- *Banksia ericifolia*
- She oak (*Casuarina cunninghamiana*)
- *Dryandra floribunda*

Deciduous Exotic Trees

- *Liquidambar styraciflua*
- *Prunus blirieana*
- *Malus floribunda*
- *Quercus palustris*
- *Magnolia kobus* var. *borealis*
- *Betula pendula* (syn. *B. verrucosa*)
- *Ginkgo biloba*

Annuals

- Antirrhinums
- Iceland poppies.
- Nemesia
- Marigolds, French
- Stocks, 10-week

Exotic Flowering Shrubs

- Camellia Duchess of York and Mathotiana
- *Rhododendron ponticum*
- *Forsythia intermedia spectabilis*
- *Podalyria calyptrata*, coastal
- *Protea neriifolia*
- *Prostanthera rotundifolia*
- *Ceanothus impressus*
- *Leucospermum reflexum*, dry position
- *Cydonia japonica*
- *Viburnum burkwoodi*

Herbaceous Plants

- Iris, bearded
- Kniphofia hybrids
- Dahlia
- Chrysanthemum, decorative
- Carnation Phoebe
- *Scabiosa caucasica*
- *Erigeron* Elsie
- Pentstemon hybrids
- Helenium, dwarf section

Bulbous Plants

- *Agapanthus africanus* (syn. *A. umbellatus*)
- Narcissus Soleil d'Or
- Freesia *burtoni*
- *Lilium tigrinum*
- *Lilium regale*
- *Lachenalia aurea*
- Gladiolus Picardy
- *Iris xiphium* var. Wedgwood and Yellow Queen

Rock Plants

- Aubrietia hybrids
- *Lithospermum prostratum* (*L. diffusum*)
- *Phlox subulata*
- *Alyssum saxatile*
- *Erica darleyensis*
- *Daphne cneorum*
- *Nepeta mussini*
- *Campanula muralis* (*C. portenschlagiana*)
- Dianthus species

[Reprinted from the "New Zealand Gardener," official organ of the Royal New Zealand Institute of Horticulture.

Gardeners who favour blue flowers cannot do better than sow *Phacelia campanularia,* the flowers of which are large and of a deep gentian blue. It grows freely in any good garden soil and is a most attractive plant when in full bloom; to use a hackneyed phrase, "No garden should be without it."

Wherever there are gardens there will be nasturtiums. The dwarf types, of which there are many varieties and which do not spread excessively should be grown more extensively than they are. On poor soils they remain more compact and flower more freely than when planted in good, fertile soils.

A number of other hardy annuals, such as the nemophila, Shirley poppies, viscarias, annual lupins, sunflowers, and the red linum (*Linum rubens*), are all worth cultivating, but two more deserve special mention: *Limnanthes douglassi,* a dwarf plant with fern-like foliage and large buttercup-like flowers which is very susceptible to dry conditions and should be given a cool, moist situation; and *Platystemon californica,* which has creamy, almost citron-coloured flowers. Both are miniatures admirably suitable for the front of the border.

In addition to the truly hardy annuals, several of the so-called half-hardy kinds may be grown successfully when sown in open ground in the warmer localities. Among these are nemesias, 10-week stocks, asters, love-lies-bleeding, jacobeas, and dimorphothecas.

[*Green and Hahn Ltd. photo.*

Asters grown from seed in open ground and not transplanted in the course of the experiment referred to below.

Many annuals have comparatively-short flowering periods of only 4 to 6 weeks and therefore cannot be relied on to provide a continuous bedding display throughout the summer, as is expected of dahlias, geraniums, antirrhinums, and petunias. Nevertheless, they have their uses even in bedding displays. For instance, nemesias planted alternately with antirrhinums in a bed, being quicker to produce their flowers, will provide a wealth of colour before the antirrhinums come into bloom. After the nemesias have passed over and have been removed, the antirrhinums will carry on the display.

Experiment with Asters

At one time the annual asters were among the most popular of flowers, but of recent years it has not been possible to rely on them as in the past because of the prevalence of disease among them. Experience has proved that asters will thrive on new soil that has not been under cultivation previously; second, that they are more subject to disease when transplanted; and, third, that the disease may be combated if the young plants are watered at frequent intervals with a weak solution of permanganate of potash (condy's crystals). The solution should be of a light rose-pink colour.

In one establishment in Christchurch the following trials were made with asters on a comparatively-large scale: An acre or more of ground which had been under cultivation for several years was prepared in readiness for planting. One half of the area was manured with stable manure and compost and the other fertilised with superphosphate. Some of the asters were sown under glass and pricked off into seed-trays in the usual way. Another batch was sown very thinly in seed-trays and allowed to

Plants Recommended by the District Council of the Royal New Zealand Institute of Horticulture for Planting in Southland

Evergreen Native Trees

North Island kowhai (*Sophora tetraptera*)
Lacebark (*Hoheria populnea*)
Red beech (*Nothofagus fusca*)
Southern rata (*Metrosideros lucida*)
Dodonaea viscosa atropurpurea

Evergreen Exotic Trees

Azara microphylla
Cootamundra wattle (*Acacia baileyana*)
Japanese cedar (*cryptomeria japonica elegans*)
Cedrus altantica glauca
Cupressus lawsoniana lutea

Winter-flowering Shrubs

Chinese witch-hazel (*Hamamelis mollis*)
Viburnum burkwoodi
Erica darleyensis
Daphne mezureum
Wintersweet (*Chimonanthus fragrans*)
Grevillea alpina dallachiana
Garrya elliptica

Exotic Flowering Shrubs

Forsythia intermedia spectabilis
Magnolia stellata
Telopea oreades
Embothrium lanceolatum
Callistemon citrinus Splendens
Olearia gunniana Lavender Queen
Azalea mollis (varieties)
Rhododendron fragrantissimum
Grevillea dimorpha
Cytisus scoparius Crimson King
Ceanothus edwardsi
Cistus purpurea Brilliancy

Deciduous Exotic Trees

Prunus serrulata J. H. Veitch
Pyrus malus eleyi
Magnolia soulangeana
Prunus blireiana
Laburnum adami

Native Shrubs

Veronica andersoni variegata
Veronica speciosa
Clianthus puniceus rosea
Leptospermum scoparium martini
Senecio greyi

Berried Shrubs

Cotoneaster serotina
Stransvaesia davidiana
Euonymus Handley's Variety
Eugenia ugni (Cranberry)
Arbutus unedo
Berberis wilsonae

Flowering Bulbous Plants

Anemone (varieties and species)
Iris (Spanish, Dutch, English, *I. reticulata, I. paviona*)
Gladiolus (varieties)
Tulips (species and varieties)
Daffodils (species and varieties)
Hyacinths (varieties)
Lilium (including *L. regale, L. testaceum, L. henryi, L. tigrinum, L. auratum,* and *L. longiflorum*)

Rockery Plants

Lithospermum prostratum
Iris reticulata
Cyclamen neapolitanum
Gentiana acaulis
Helianthemum vulgare (varieties)
Tulipa kauffmanniana

Annuals

Antirrhinum (Tom Thumb and intermediate varieties)
Stock (10-week and Beauty)
Phlox drummondi
Nemesia (varieties)
Marigolds (French and African)
Petunias (dwarf bedding varieties)
Lobelia Cambridge Blue
Asters (varieties)
Mesembryanthemum criniflorum (Livingstone daisy)

Herbaceous Plants

Gypsophila paniculata Bristol Fairy
Delphiniums (varieties)
Polyanthus (varieties)
Scabiosa caucasica (varieties)
Pyrethrum (varieties)
Gaillardia (varieties)
Kniphofia (varieties)
Myosotidium nobile (Chatham Island forget-me-not)
Phlox decussata

grow undisturbed until transplanted to the open ground. The third batch was sown in drills in the open ground and, apart from the necessary thinning, weeding, hoeing, and watering, was left undisturbed. Those raised under glass and pricked off into trays made more rapid growth, but after being planted out had a higher percentage of mortality up to and during the flowering period. Those transplanted to the open directly from the seed-boxes had a smaller percentage of mortality. Those sown in the open ground and not transplanted, though a fortnight later in flowering, showed little evidence of disease and the number of deaths was very low. The photograph on the preceding page was taken when these plants were in full bloom in March of last year. The asters grown in the area manured with compost had a higher percentage of deaths than did those grown in the area fertilised with superphosphate. The soil originally consisted of a poor clay loam not more than 6in. deep overlying a clay pan with sand below. It is by no means a first-class garden soil.

This experiment has been carried out for 2 years with practically the same result on each occasion. The asters were not grown on the same area each year.

Propagation by Layering

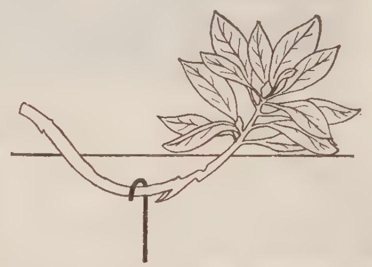
Many shrubs which are difficult to propagate from cuttings can be raised from layers successfully at this season. The method is as follows:—

The spent surface soil around and beneath the bushes to be layered is removed and replaced with a fine compost composed of a good loamy soil passed through a ¼in.-mesh sieve, leaf mould, and plenty of sharp sand. The compost, which should be reasonably moist but not wet, should be made firm and even. A convenient healthy branch is then bent down carefully until it comes into contact with the compost. After it has been ascertained where the branch will meet the soil toward the tip, a wound is made with a sharp knife midway along the part of the stem which will be buried in the soil. The layer is then embedded in the soil and held firmly in position with one or more pegs made from 8-gauge wire. The pegged-down portion is covered with another few inches of compost, which should be given a thorough watering to settle and consolidate it. Apart from weeding and an occasional watering in dry weather, the layers should be left undisturbed for 12 months; indeed some, such as rhododendrons and magnolias, require fully 2 years to develop a sufficiently-good rooting system to warrant the layers being severed from the parent plants.

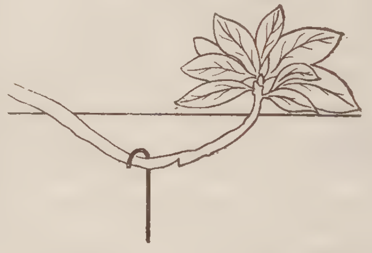
There are various methods of making the layer. Some plants will root if the portion to be layered is bent down and covered with soil. In most cases, however, a wound such as a tongue or notch is made to arrest the sap flow, thus causing a callus to form and inducing roots to develop at the injured point. To make a tongue the knife is inserted below a joint and the cut made upward toward it. For the notch method a notch is cut out of the stem on the underside at the point where it is pegged down. For some subjects with pliable stems the wound is made by giving the stem a twist which is sufficient to rupture the vessels and cells, thus causing rooting to take place at the affected point. Lime trees are frequently propagated in this manner.

A tree that has been cut over will send up numerous suckers around the stump. These suckers, if treated as explained, will root within 12 months, when they can be cut away from the parent stump and grown on until they are ready for planting out as specimen trees.

Sometimes, because of the habit and character of the bushes, bending the lower branches down to ground level for layering is difficult. In such cases the compost is built up to a convenient height by means of turves as retaining walls so that the branches may be layered into it. In other cases the specimen to be layered is keeled over on to its side. This is effected by digging a trench round the bush and excavating the soil until it is possible to force the subject over carefully until some of the branches come into contact with the soil's surface.



The tongue and notch methods of layering a branch of a shrub for propagation. The process is described on this page.



Shrubs which may be readily propagated by layering include rhododendrons, azaleas, magnolias, cydonias (japonicas), *Osmanthus delavayi, Rhus cotinus*, camellias, corylopsis, enkianthus, viburnums, hamamelis, and garrya.

Other Work for the Month

Complete the pruning of roses as soon as possible and recondition the beds in which they are planted as described in last month's "Journal."

Evergreen shrubs such as escallonias, buddleias, euonymus, *Garrya eliptica*, and many New Zealand natives should now be pruned where it is necessary to improve their shapeliness.

Evergreen climbers such as honeysuckle and ivy should be trimmed back now. Ivy is an excellent subject for covering walls and fences, but if left unchecked, it will become top heavy. To prevent that it should be cut back to the main stems each spring. Fresh foliage will quickly develop, and in a week or two the plant will again be completely covered with glossy green leaves.

If necessary, herbaceous perennials such as michaelmas daisies, phloxes, *Scabiosa caucasica*, and pyrethrums may still be divided and replanted. However, this work must be treated as urgent so that the young growths that are developing rapidly will not receive a check severe enough to impair them for the rest of the season.

To provide early supplies of flowers the first of the gladiolus corms should be planted out into soil that has been well prepared in advance. If not already attended to, the corms required for later planting should be cleaned, placed in trays, and kept in a cool place to prevent their starting into growth too soon.

Plant out violas, pansies, and in favourable localities, antirrhinums, and 10-week stocks that are sufficiently hardy after having been grown on under glass during the winter.

Plants under Glass

All pot plants under glass should be overhauled and all those requiring repotting should be attended to at once. This applies in particular to what may be termed the permanent subjects such as palms, ferns, and aspidistras.

Fuchsias that have been rested during the winter will require immediate attention. Prune them where necessary, rub off all superfluous bark (which provides an ideal hiding place for mealy bug), remove the plants from their pots, carefully shake out the old soil, and repot them. To induce the production of fresh growths the plants should be syringed frequently with tepid water. Where plants are being hardened off in frames the lights should be removed on all favourable occasions.

Sow seeds of gloxinias, streptocarpus, celosias, and tuberous-rooted begonias. Tubers of gloxinias and begonias that have been rested during the winter may now be started by placing them in trays of light, sandy compost. Do not water them too much at this stage; many of the tubers are saucer shaped, and if moisture collects and remains in the centres of them, decay will set in. Keep the compost moderately moist by light syringings.

Cyclamen will now be at the peak of their flowering and, unless required for seed, all blooms should be removed as soon as they are over.

As soon as the chrysanthemum cuttings have rooted they should be potted up into 3in. pots. Those established in pots should be placed in a cold frame and given plenty of air and light to prevent their becoming weak and spindly.

Choosing Shoes for Children and Adolescents

IT is strange that people who would not countenance clothes that are uncomfortable or badly fitting will wear shoes that hurt and tire the feet. Yet, because people spend so much time on their feet, ill-fitting and badly-designed shoes can cause endless foot troubles. This article by Eirene E. Unwin, Rural Sociologist, Department of Agriculture, Dunedin, offers advice on the selection of suitable footwear, particularly for children and adolescents.

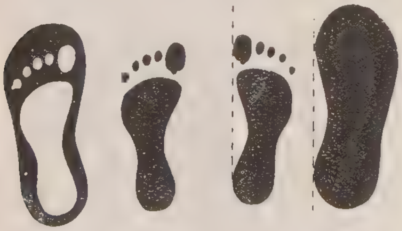
[*Jack Welsh and Sons photo.*

Shoes showing desirable characteristics for children and adolescents. Left—A school shoe for a 10-year-old, with sides curving right in to grip the heel, straight inside line, and low heel. Middle—Two views of lace shoes for a pre-school child, with excellent shape, breadth across the toe joint, straight inside line, sufficient length for all the toes, back and back of sides curved in to grip the heel, a high lace-up, and ample height above the toes. Right—A 'teen-ager's dress shoe, with a well-gripping heel, ample toe width, height, and length, and smart appearance; the very low cuban heel is the highest a 'teen-ager should wear, and for walking and working a lower heel is better.

BAD shoes in childhood and adolescence are the beginning of foot troubles, but because a child's foot is flexible a tight shoe can be worn, and can deform the foot permanently, and yet cause little or no pain to the child. Once the feet are deformed the damage is done. The pain comes later with corns, calluses, bunions, and other unpleasant consequences. By the time the late 'teens are reached a natural, healthy foot would be extremely uncomfortable in a shoe that was too narrow, too short, or had too high a heel, so that if correct shoes are always worn until the foot has stopped growing, the young adult may not then be tempted to begin using footwear that is too tight and of a shape quite different from that of the natural foot. A deformed foot may have become used to being squeezed; a natural foot demands shoes that fit it. Therefore, it is imperative to ensure that children and adolescents always wear correct shoes.

Points of Construction

Many points of shoe construction and fitting are known to the assistant at the retailer's shop but not to the customer, who therefore must rely on the assistant's advice to a certain extent. However, the customer can check a number of points for herself if she knows about them. That is particularly important for a mother when buying shoes for her children, because ill-fitting shoes do not necessarily hurt the child's foot, but they can do lasting damage.



Shoes should be made to fit the shape of the feet. This diagram shows the imprint of a child's foot and the sole of a well-fitting shoe.

Length should be sufficient to allow for elongation of the foot when walking. A foot that is being stood on is longer than when it is relaxed, and in walking the same foot becomes a little longer still. Therefore, when a child is having new shoes fitted he should stand firmly on both feet and there should then be ample length beyond the longest toe inside both shoes. Such length allows a little for growing.

Width should be adequate across the joints of the foot as well as sufficient to allow the child to fan out his toes. Adequate width may be spoilt by insufficient depth at toes and joints—the top of the shoe may press too closely on to the top of the toes; cheap sandals in particular tend to offend in this respect.

A snug-fitting heel is important. The back of the shoe should be well moulded and should curve in. Poorly-moulded backs that do not grip the heel snugly should be avoided.

Heels on all children's shoes should be low or negligible and shoes for adolescents should have heels not more than about an inch high. Attractive "dress" shoes for 'teen-agers are made with these heels.

Straight inside line: The heel, big toe joint, and big toe of a natural foot are in a straight line, so the inside line of the shoe should also be straight. Any shoe the inside line of which bends in front of the big toe joint will push the big toe over, and therefore is harmful. Similarly, the front of the shoe should be the same shape as the front of the foot—as long over the second as over the big toe and then curving back over the other three.

The inside should be smooth and well finished, particularly in sandals and any other shoes worn frequently without socks or stockings.

Fastening: Lace shoes are usually best for growing children, as they can be kept comfortably tight and snug, even when new before the foot has grown fully into them. If the shoes are fastened with a strap and button or buckle, it is preferable that the strap fasten over the instep, not from the back of the heel, which gives no support and allows the shoe to bulge at the sides in walking. Instep straps should not be so low or so far forward as to allow the shoe to slip at the heel, but should come firmly up over the instep from the sides of the shoe. The fastening should be arranged to hold the strap firmly, preventing it from becoming either loose or tight; that may mean altering the position of the button and altering it again as the child grows, or punching another hole for the pin of the buckle. Shoes without either laces or strap fastenings are not advisable for small children; if adolescent girls wear them, the front of the shoe should come well up the instep and should not be so low or so far forward as to allow slipping. A small elastic gusset is often inserted under the ornamental front of a strapless shoe; these are good, and are renewable if they perish.

If the shop patronised has x-ray equipment, it should be used to check length and width. Let the child have a shoe on one foot and the other one bare and stand with both feet under the x-ray together. Compare the shape of the foot with the shoe on it with that of the bare foot. The shoe should not alter the shape of the foot at all, and the child should be able to move the toes of either foot with equal freedom.

If the toes are being squeezed together, be sure this is not caused by a tight sock.

Child's Attitude

The attitude of the child is important when shoes are being bought for him. Any of the following three situations may cause difficulties:—

1. He may be so anxious to have his new shoes that he will say the first pair tried is comfortable, whether it is or not. Therefore, it is wise to assure him that he will have his new shoes, even if this first pair is not right.

2. He may take a liking to a particular, often a fancy, pair and will insist that only this pair is comfortable, whether it is or not. Though such an insistence should not overrule the mother into buying a pair of shoes which she knows to be unsuitable, it is well to give some regard to the child's likes and dislikes. A small child can be made very miserable by being forced to wear a pair of shoes he does not like. He will tend to take them off on every possible occasion, and the imaginary hurt they cause him may be very real to him.

3. He may dislike or be shy of the shop assistant. To overcome this the parents as far as possible should patronise one shop, where they will become known and, perhaps more important, where the children will come to know and have confidence in the assistant.

Details other than those listed and which require special fitting, such as narrow or wide feet, long or short insteps, or unusually high or low arches, the assistant should know more about than the customer. He should bring out only shoes that he knows ought to meet the requirements of the child. It is as well to patronise shops that employ qualified shoe fitters, as they have been through quite a thorough training and should give better and more careful service than unqualified assistants. As feet and shoes to fit them are highly individual, again it pays to go always to the one shop so that the assistant may come to know the customer's feet and preferred styles.

Qualified assistance frequently will recognise the need for corrective or remedial foot treatment before the mother or child is aware that anything is radically wrong. If a fitter advises treatment, medical advice should be sought at once. Delay will tend only to make the trouble worse and prolong the necessary treatment when it is given.

Boots or Shoes for Children?

Thoroughly-healthy children do not need support for their ankles in the shape of boots. Unfortunately, many children in New Zealand tend to have weak muscle tone, and a little support from boots may be helpful. The Plunket nurse would give advice on this subject. On rough gravel roads boots help small children considerably, as the stones are large in comparison with toddlers' feet and very small ankles are somewhat unsteady.

For outdoor winter wear boots are useful for schoolboys, too, as boys are notoriously hard on their shoes and boots usually stand up to wear and tear better than shoes, and also are more weatherproof.

Repairing Shoes at Home

Methods of repair vary with the way in which the shoe is constructed. If most shoe repairing is done at home, it is a good idea to ask the assistant whether new shoes just bought need any special repair methods, and, if so, to find out what these are.

Care of Children's Shoes

If a pair of shoes slips at the heels, it may be because the heels do not grip well or because the straps are too far forward. The straps tend to be at fault particularly with sandals.

Heel slipping sometimes may be remedied by tightening the straps or laces. Failing that, suede or sponge-rubber heel linings may be fastened to the insides of the heels. These are quite cheap. Suede heel linings should be fitted by a shoe repairer, but the sponge-rubber ones may be bought and applied quite easily at home. The manufacturers' directions should be followed carefully.

Children should never be allowed to wear shoes that are loose and slip badly at the heel, or they will tend to walk with their toes curled down and their feet unrelaxed to hold their shoes on. That is bad for their feet and makes the children walk awkwardly. Slipping heels are also very hard on socks and stockings.

Few children look after their shoes when they are wearing them—in fact, little children delight in jumping in puddles, kicking stones, and generally ill treating their shoes without intending to do so. Limiting children's play and freedom by insisting that they do not do these things is not desirable, but steps may be taken to counteract to some extent the effects of rough wear by careful treatment of the shoes when they are off the children's feet. Here are some useful ideas for making children's shoes last longer:—

Be sure a child wears shoes that are suitable—brogues in winter, gumboots for outside in very wet weather, sandals for summer or indoors.

Dry wet shoes, but do not put them in front of a fire, on a rack above the stove, or in a cupboard above a hot-water cylinder; such heat dries the leather so that it cracks and breaks quickly. Wipe the shoes with a damp cloth, stuff them with newspaper, and lay them on their sides to dry overnight in a draughty place.

Before letting the child wear them again, ensure that they are perfectly dry and well cleaned with boot polish. Even if they do not get wet, regular cleaning with polish helps to preserve the leather.

Have shoes repaired as soon as they begin to need it. Do not let them wear so badly that major repairs become necessary, as these tend to weaken the structure of the shoes.

Have new shoes for schoolboys, and for most schoolgirls, too, fitted with metal toe and heel plates as soon as they are bought. Rubber heels are quieter than metal ones, but are not nearly as hard wearing and are really suitable only for indoor shoes; they can be used on outdoor shoes for adults and anyone not giving them the hard wear they usually get at school.

If a child scuffs his shoes so that they are worn heavily in a particular place, have a metal plate fitted on this part.

Goloshes and Gumboots

If used correctly, goloshes and gumboots give useful and excellent service. Goloshes keep shoes reasonably dry while on the way to school, but should be taken off as soon as the child gets indoors. If they are kept on, they prevent perspiration from evaporating, keeping the feet damp and in consequence cold.

The same danger is present with gumboots, which are really suitable only for country wear and for wet wintry weather. At least two pairs of socks worn inside prevent their making the feet so cold, but in any case children should not wear them for long periods.

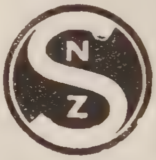
Looking to the Future

Wrong or poorly-fitting shoes are probably the most important single cause of nearly all the foot troubles of this generation. To prevent the next generation from suffering in the same way today's children must wear only correct well-fitting shoes. Nothing else will serve; they must have correct shoes if their feet are to remain healthy, and only healthy feet are thoroughly-serviceable feet, able to do all that is asked of them without giving trouble.

Therefore, when buying shoes for children it is worth while to make sure that they are the best obtainable—and the best are not always the most expensive. Ask about the points mentioned in this article. Co-operate with the assistant to ensure that the child gets what is really best for his feet. Any retailer should be glad of such informed co-operation from his customers.

Standards in Footwear

The New Zealand Standards Institute has produced standard specifications for footwear governing such aspects as thickness of sole, number of stitches to the inch, and quality of leather, linings, and stitching thread. Shoes which come up to the minimum specification of the Standards Institute bear the New Zealand Standard Mark.



Grades above standard are still needed, for shoes of higher quality are made. In the past year or so manufacturers and retailers have made considerable progress toward better shapes for children's shoes, and in consequence an all-round improvement is apparent. The New Zealand public is offered a higher standard and more variety in children's shoe shapes now than ever before. A high percentage of really good lasts (on which the shape of the shoe largely depends) is used in the higher-quality shoes.

However, much remains to be done. Informed consumer demand and co-operation between retailers, manufacturers, and consumers will be the most important factors in obtaining a permanently-raised standard over all lines of children's and adults' footwear. The part of the consumer and the parent is to discriminate in choice of shoes and never to accept other than the best obtainable. Only refusal to buy poor-quality articles will check their being offered for sale.

The Correct Use of Paint in the Home

MANY a housewife likes to brighten up some part of the interior of her house with fresh paint from time to time. A beginner need not fear to try painting, provided she knows a little about the behaviour of paint. Some points which may be useful to the person who has had little experience of painting are dealt with in this article by Edith G. McNab, Rural Sociologist, Department of Agriculture, Dunedin.

THE choice of paint depends mainly on the purpose for which the paint is required. The smooth, glossy, hard finish of enamel paint is desirable for furniture and shelves or bathroom and kitchen walls, for it will stand up well to repeated washings. Living room or bedroom walls may be better finished with a flat-surfaced paint, which provides a more pleasing texture from the point of view of interior decoration. For floors special floor paint or varnish should be used, because ordinary wall paint will not wear as well. Flat paint should be used for undercoats. Information about the quality, quantity, and kind of paint to buy should be obtained from a paint salesman, who should be told the size of the area to be painted.

Never mix different brands of paint. If the exact shade required is not obtainable, it is sometimes possible to mix different colours of the **same** brand to get the shade desired.

Preparation of Surfaces

Any surface to be painted must be dry, clean, and free from grease or wax. Moisture will cause blistering of the paint, and "creeping" will take place over a greasy surface, on which paint will not dry properly. Surfaces which may be greasy, such as kitchen walls near the range, or which may have been waxed, such as floors or furniture, must be thoroughly cleaned before painting. If an alkaline solution is used for cleaning, all traces of it must be removed before applying paint, as alkalis saponify the oils in oil paints.

Roughnesses in the surface should be smoothed with glasspaper, finishing with a fairly fine paper. The glasspaper should be wrapped around a flat piece of wood or cork of a size comfortable to grip so that the surface of the glasspaper is flat on the surface to be painted. (The correct method of doing this is shown in the upper illustration on the next page.)

Remove any dust left after glasspapering. Small holes or cracks should be filled with putty after the first coat of paint is dry. (Putty can be made by mixing whiting with raw linseed oil and kneading it until it is plastic. Do not use so much oil that the mixture is sticky to handle. Putty can also be bought ready made, but usually requires some kneading before use.) A spatula or putty knife is the best tool for applying the putty. New wood should be well seasoned before being painted.

If the surface has been painted previously, it may need only thorough cleaning and a light glasspapering before repainting. If the old paint is badly cracked or very chalky, it is best removed before fresh paint is applied. A painter would probably burn off such paint, but the housewife, with a small area to treat, can use a hot solution of caustic soda (1lb. to a gallon of water).

The usual precautions in handling caustic soda should be observed, and the solution should be applied with a fibre brush, not a bristle brush, because caustic soda will destroy bristles. The solution softens the paint, which may be wiped off. Rinse the surface well, because any caustic soda left will destroy the new paint as readily as the old. This treatment raises the grain of the wood, so the surface will require glasspapering before painting. Painters' sugar of soap can be used in much the same way as caustic soda.

Do not attempt to paint over varnish without first removing the varnish. Metal surfaces to be painted must be free from rust, which can be removed with a wire brush or emery paper.

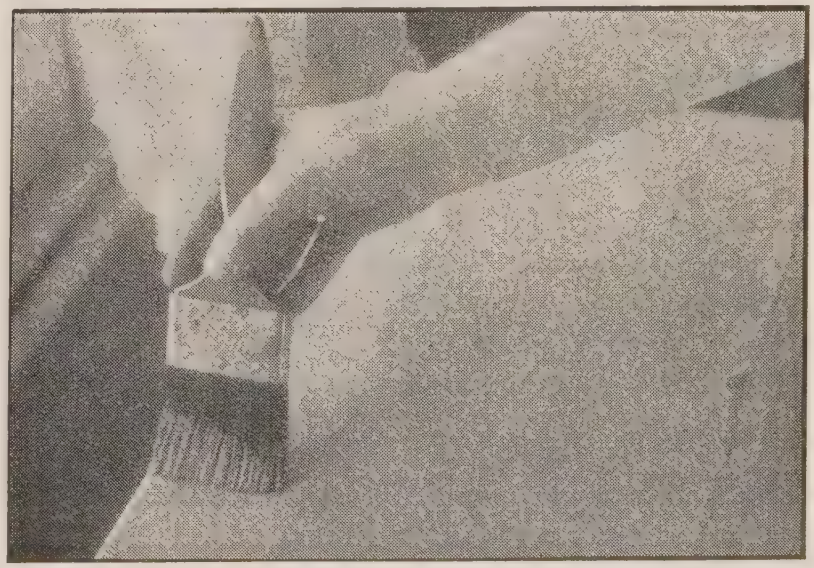
Application

To apply paint use a good brush, of a size suited to the work. A good brush is likely to prove more economical in the long run than a cheaper brush and it gives more satisfaction in use. As a general rule, hold the brush with the thumb on one side of the handle and the fingers on the other. This is the most efficient grip, as a turn of the wrist will move the brush from side to side. The hold may be varied for reaching into awkward places.

Paint must be stirred very thoroughly before use, as the heavier ingredients sink to the bottom. It is advisable in mixing first to pour off half the contents of the tin and then, when the remaining half has been thoroughly stirred, to pour back the thinner top half. Further pouring of the paint from one tin to another will complete the mixing. Stir again from time to time during painting. Mixing time can be reduced by inverting the tin of paint several times for a day or two before opening the tin.

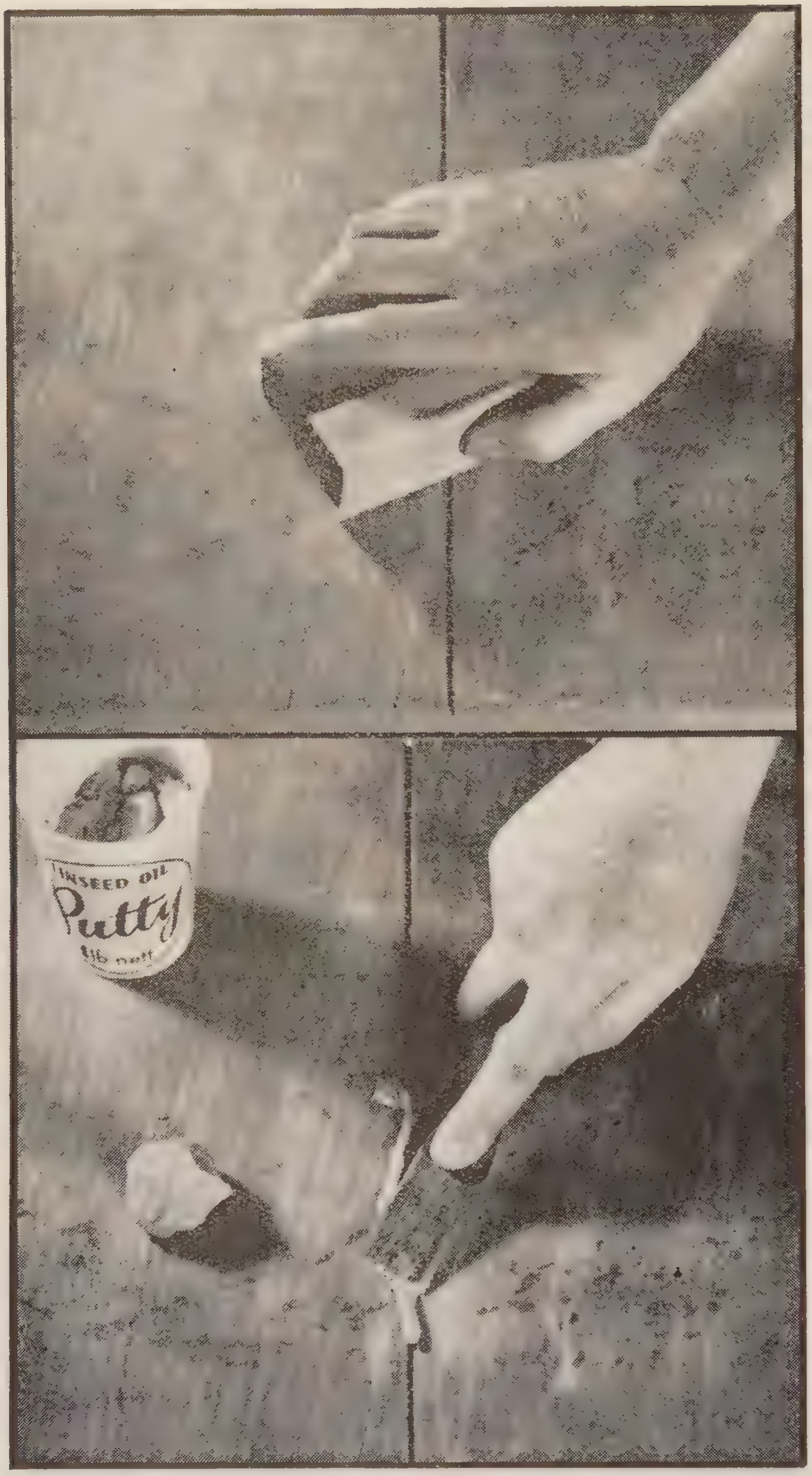
Generally ready-mixed paint used soon after it is bought needs no more preparation for use than thorough mixing, but if it has a "heavy" feel when brushed and has a tendency to leave coarse brush marks, it is too thick for applying and should be thinned by adding a thinner. Frequently old paint which has been stored for a long time after part of it was used thickens up considerably. Most manufacturers give directions on the labels of tins concerning the thinner to be used, but the usual thinner is oil of turpentine. Care should be taken that too much thinner is not added or the paint will be spoilt.

Do not overload the brush with paint, as that leads to splashing and to putting the paint on too thickly, when it may run. Dip the bristles only an inch or so into the paint, especially at first. Excess paint can be removed from the brush by drawing it against the side of the tin. Brush the paint on well, working the brush backward and forward with the grain of the



[Jack Welsh and Sons photo.

The usual way of holding the paint brush—the thumb on one side of the handle and the fingers on the other. A turn of the wrist will move the brush from side to side.



[*Photo News Ltd. photos.*

Upper—Smoothing the surface to be painted by rubbing glasspaper over it. The glasspaper should be wrapped around a flat piece of wood or cork as shown. Lower—Filling cracks in the surface with linseed-oil putty. If ready-mixed putty is used, it should be kneaded before it is used.

wood. After the paint on the brush has been applied, finish the area with light strokes of the brush, working only one way, from the unpainted area toward and overlapping the last area painted. Finish each stroke very lightly so that no brush marks are left.

Work in strips, doing a few boards at a time. If a room is being painted, begin with the ceiling, then work from the top downward on each wall in turn.

When painting ceilings or the upper part of walls use something secure to stand on, such as a solid table or sound step-ladder, and avoid the accident which will happen sooner or later if a rickety piece of furniture is used. Save energy by finding something of suitable height and avoiding extra stretching or bending.

Never leave a strip unfinished; otherwise a permanent mark will be left at the stopping place. For example, if there is not time to finish a wall, finish the strip being painted to the end of the boards or the corner of the wall.

Cleaning Splashes

If any splashes are made, wipe them up at once, using a duster or a rag soaked in turpentine. (Mineral turpentine is quite suitable for this and is cheaper than oil of turpentine.) Do not let any splashes dry on the part to be painted, for the marks may show through the finished painting.

When two colours are to be used adjacent to each other allow one to dry before putting on the other; this prevents diffusion of the colours where they meet. If the same brush is to be used for the second colour, clean it before applying the second colour.

The previous coat of paint must be quite dry before putting on another coat. Before applying the next coat it is a good plan to leave each coat 48 hours after it appears to be dry. The number of coats necessary depends on the condition and colour of the surface before painting. If it has never been painted before, or if the last paint has been removed, at least two coats will be necessary. Three coats may be better (use flat paint for the first two) and it may require three coats of a light colour to hide an old dark paint.

Quick-drying enamels have to be put on rapidly, so it is best to avoid using enamel until some experience of painting has been gained.

Never allow paint to dry on a brush. A brush which is to be used again in a few days may be left suspended (but not standing on its bristles) in water, and the water removed from the bristles before the brush is used for painting again. When the painting is finished rinse the brush in mineral turpentine, wash it in warm, soapy water, rinse it in fresh, warm water, and dry it.

Before they are used painted furniture, benches, or shelves should be left a day or two after the paint appears to be dry so that the risk of spoiling the surface is lessened. This is particularly important if any heavy objects are to be put on painted shelves.

The Nutritive Value of Animal Foods, Fruit, and Vegetables

THE nutritive value of cereals and milk and its products, two of the most important classes of food, both economically and nutritionally, was discussed in an article in last month's "Journal" by Evelyn E. Moore, Rural Sociologist, Department of Agriculture, Auckland. The value of other nutritionally-important foods—animal foods (such as meat and eggs), vegetables, and fruit—is the subject of this article. The third and final article in the series, to appear next month, will deal with fats, beverages, and some of the foods which, because of low nutritive value or high cost in proportion to their nutritive value, should not be allowed to figure too prominently in the menu.

AS long as New Zealanders maintain their place at the head of the list of meat-eating peoples it is most unlikely that the average person will ever fail to obtain sufficient high-quality protein from his diet. However, though the amount of meat eaten probably could be reduced considerably without any ill effect on health, it is certainly not recommended that people go to the other extreme and become vegetarians.

Eggs, Meat, and Fish

Three foodstuffs which have much in common are eggs, meat, and fish. With milk and cheese they provide the high-quality protein essential for growing children, and for adults, too. The protein in these foods is, perhaps, of the greatest value nutritionally, for one serving of eggs, meat, or fish, with the amount of milk recommended for health (1 pint for an adult and 1¾ pints for a child), provides all the high-quality protein essential for growth and health.

These foods are also excellent sources of the mineral phosphorus (an essential nutrient required for both bone and tissue growth and maintenance), which is rarely deficient in the New Zealander's diet, simply because sufficient and often more than sufficient meat is eaten.

Third, they are fair sources of energy. Moderately-fat mutton and beef have about the same calorie content as bread; very lean meat, kidneys, brains, and fish have about half the energy value of bread, and liver and eggs occupy an intermediate position.

Fourth, they are all good sources of at least one vitamin. Though the vitamin content of meat from organs and muscles, as well as from different animals (beef and pork, for example), varies somewhat, the variation is seldom so great as to cause one class of meat to be regarded as definitely inferior to other classes in food value. Muscle meat is a good source of niacin and riboflavin—vitamins belonging to the B group—and a fair source of other B vitamins. Fish also contains them, but usually in smaller amounts. Poultry, rabbit, tongue, and most other organ meats are also good sources of niacin and riboflavin; one serving will provide from a fifth to the whole of the daily requirement of niacin and a tenth or more of the requirement of riboflavin.

Fifth, they are all at least fair sources of iron.

Like all other foods, however, eggs, meat, and fish are not ideally balanced nutritionally, being deficient in several nutrients, perhaps the most important of which is calcium. Eggs contain more calcium than does meat, but cannot be rated as good sources, for one egg provides only about 3 per cent. of the daily need for calcium. Consequently they cannot be substituted for milk or cheese, though in other respects their nutrient content may equal that of these foods. Second, like cereals and milk, these foods contain negligible amounts of vitamin C. Third, they are, with the important exceptions of liver, kidneys and eggs, very poor sources of vitamin A.

The cost of these foods also limits their use, particularly in low-cost diets, for though they are little more

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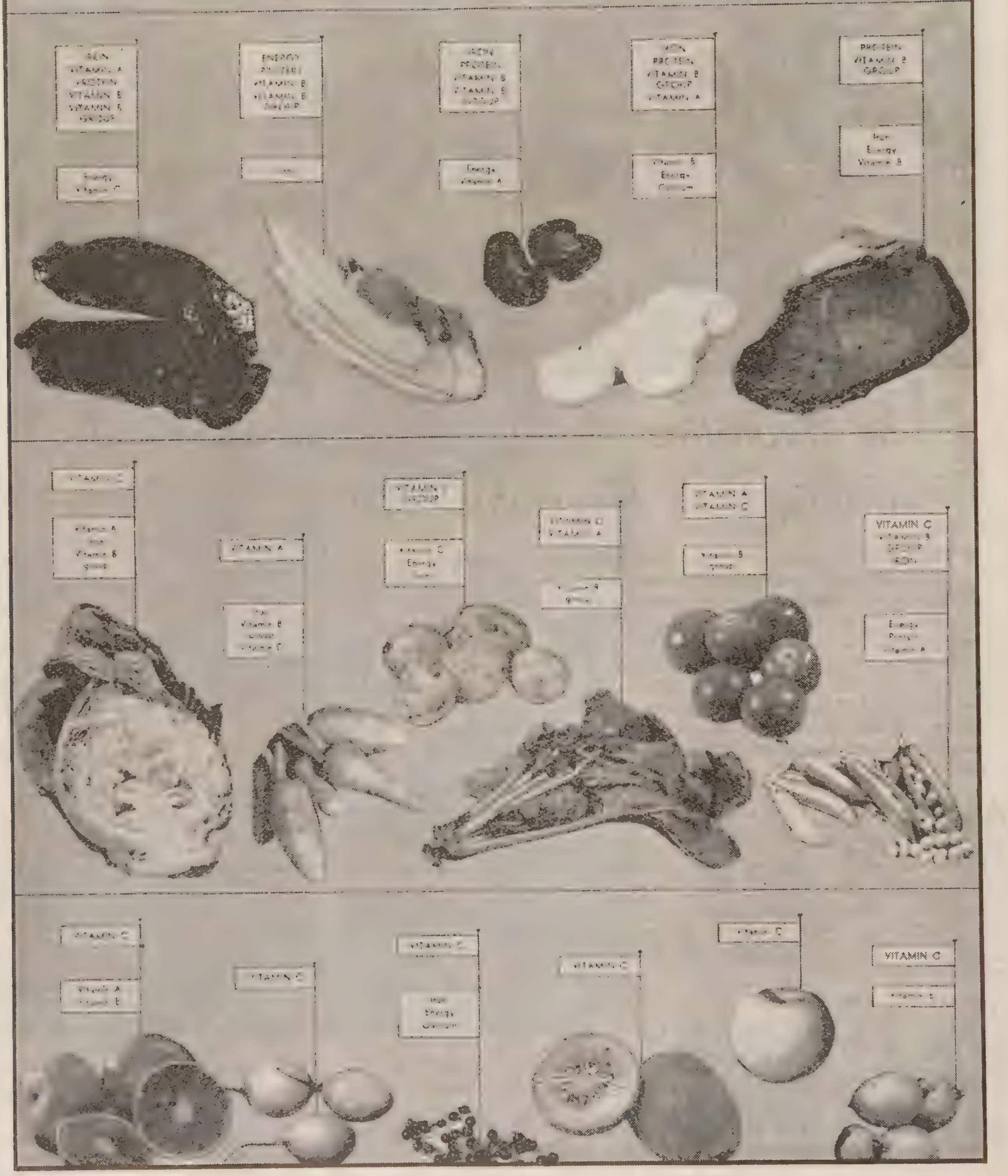
Heading photograph by Sparrow Industrial Pictures Ltd.

NUTRIENT CONTENT OF MEAT, EGGS, VEGETABLES, AND FRUITS

Only calcium, iron, energy, protein, vitamins A, C, and B_1, and the vitamin B_2 group are included because of the relative abundance of other nutrients in foods. Large type on a label indicates that the food is a good source, small type that it is a fair source, and no label that it is a poor or negligible source or has not been definitely tested.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expensive sources of good-quality protein, energy, and some vitamins than milk or cheese, they contain no calcium. Consequently, as milk must be included in the diet to provide calcium, it is also relied on to provide most of the high-quality protein and vitamin B_2 and whole cereals and the cheaper root vegetables are used instead of meat as sources of iron, calories, and other nutrients in the low-cost diet.

Unique Value of Liver

The nutrient content of some foods in this group is better than that of others, and that is particularly true of liver, pork, and eggs. Liver occupies a unique place among foods because of its high nutrient content. Yet, though its chief disadvantage as a food is its limited availability, it is likely that much sound liver, particularly on farms where meat is home killed, is not used because of the prejudice which has developed against its use and the fear that it may cause hydatids; this belief has no foundation in fact, for it is impossible to develop hydatids directly from cooked food—or, indeed, any food—provided it has not been contaminated with hydatid eggs from dust or dogs.

Liver is the best food source of iron and vitamin A, one serving providing more than the whole daily requirement of either of these nutrients, and it is one of the best food sources of all the vitamins in the B group and of protein. Thus it is well worth a place in the menu when it is available, as its use is an insurance against anaemia. Therefore, it is an especially-good food for infants, adolescent girls, and expectant mothers, whose need of iron is greater than that of other members of the community.

Eggs also have a higher nutritive value than ordinary muscle meat, for they are a good source of vitamin A (one egg contains about a sixth of the daily requirement) and of iron in a very easily assimilable form.

Pork and bacon are particularly valuable for their vitamin B_1 content as they contain about 10 times as much as beef, two or three times as much as wholemeal bread, or a quarter the amount present in vegetable extracts. Therefore they are practically the richest ordinary food sources of this vitamin. Though their inclusion in the menu is not essential for a healthful diet, they are, from the nutritive point of view, more worthy of the money spent on them than, for example, an expensive piece of undercut steak. A serving of pork also provides at least five times as much vitamin B_1 as a teaspoonful of vegetable extract, and other nutrients are present in pork as well.

Therefore, though eggs, meat, and fish have a valuable place in the diet, they require to be balanced with milk and cheese to provide calcium and vitamin A, vegetables and fruit to provide vitamins C and A, and cereals to provide energy at a lower cost than is possible with meat and eggs.

Vegetables

The need for eating plenty of vegetables to maintain health and fitness is well known, but perhaps not until the war years, when they were often the sole sources of vitamin C and almost the only foods supplying vitamin A in the diets of Britons and other Europeans, was their value fully appreciated. In addition, some of them provide fair amounts of good-quality protein and iron, and when milk was not obtainable they became one of the biggest suppliers of calcium. In fact, they formed a large part of the diet of many people in the occupied countries and were responsible for the general health of northern Europeans being as good as it was, as well as for the absence of such diseases as scurvy and blindness caused by vitamin A deficiency. Their chief defect was their low energy value, so that it was almost impossible to eat sufficient to provide for the energy requirements of the body. When plenty of energy foods are available that aspect is unimportant, for the worth of vegetables, like that of milk, is far from being assessed by their energy value alone. However, they do vary considerably in nutritive value, so much so that it is recommended that not only vegetables, but vegetables from each of the two main groups—potatoes and other root vegetables and green vegetables—be eaten daily.

Any classification of vegetables into groups must be decidedly arbitrary, but the following may suffice:—

Green and leafy vegetables, including the cabbage family, the spinach family, leguminous green vegetables, and many salad vegetables.

Roots and tubers.

Fruits and seeds, including cucumbers, chokos, egg fruit, marrows, mushrooms, pumpkins, and tomatoes.

Green and Leafy Vegetables

Vegetables in this group are valued mainly for their content of vitamins A and C. Even within the group, however, they vary greatly in their vitamin content. Therefore while it is recommended that at least one generous serving of vegetables from this group be included in the menu daily, it is also recommended that the choice be made from as wide a selection of vegetables within the group as possible, so that any individual nutritional defect of a food in this class will not be unduly accentuated. To take an extreme example, these vegetables are nearly all good sources of vitamin A, but cauliflower contains none at all, though it is an excellent source of vitamin C and a fair source of other vitamins and minerals; thus, it is possible that, if cauliflower were the only vegetable in this group to be eaten, a slight vitamin A deficiency might develop.

These vegetables should always be used as fresh as possible, for vitamin C is lost quite rapidly during storage, and, if they are allowed to wilt, green vegetables often contain negligible amounts of the vitamin.

The Cabbage Family

This group includes cress, cauliflower, brussels sprouts, turnip tops, and kale. As their energy value (5 calories per ounce) is only about a fourteenth that of bread, obviously their nutritional value is the result of their vitamin and mineral content.

Some of them, particularly kale and turnip tops, are good sources of calcium and iron, 3oz. of either containing about a tenth of the daily requirements of these minerals, and many contain large amounts of carotene or pro-vitamin A, which is usually present only in the green leaves, the amount depending on their greenness. A serving of turnip tops will provide a quarter or more of the daily requirement of vitamin A, but the white heart leaves of a winter cabbage none at all.

However, their chief value nutritionally is in the provision of vitamin C, as a serving of any one of them, freshly picked and cooked rapidly in a minimum of boiling water or in a pressure saucepan, will contain at least half the daily vitamin C requirement. Used raw in salads they provide even more of this vitamin, but, as it is usually impossible to eat as much raw cabbage, for example, as cooked cabbage, the total vitamin C obtained from a raw green vegetable salad is probably about the same as that from a generous serving of the cooked vegetable, provided it has not been overcooked, cooked with baking soda, or left standing a long time before being served.

The Spinach Family

Ordinary and New Zealand spinach and silver beet are as good sources of vitamins A and C as the cabbage family, but they contain small amounts of oxalic acid salts which make their own calcium and iron, and probably some of the calcium in other foods, useless to the body. However, to presume that for this reason they are harmful foods and should not be eaten is quite incorrect, for the oxalates are not nearly concentrated enough to affect health. Yet, if they figure frequently on the menu, it is important to ensure that rather more than the recommended allowance of milk is included in the diet, so that sufficient calcium is consumed to compensate for the wastage which occurs when some of the oxalic acid combines with the calcium in milk or other foods and thus prevents it from being absorbed from the intestine.

When this precaution is observed these vegetables are valuable, especially as they can be grown to be ready at times when other vegetables are scarce.

Peas and Beans

Though french or runner beans are not very nutritious vegetables, containing less than half as much vitamins A and C as green vegetables and small amounts of other nutrients, peas and other beans are much more nutritious and have perhaps the highest all-round nutrient content of any vegetable. They contain about half as much vitamin C as cabbage, and peas contain about half as much vitamin A. Their vitamin B_1 content is equal to that of wholemeal bread, and they are good sources of other of the B vitamins and iron and fair sources of protein and calories or energy. Their general popularity as vegetables is certainly justified if food value is to be the criterion.

Salad Vegetables

Lettuce, celery, radish, spring onions, chives, parsley, cucumber, tomatoes, endive, cress, and watercress are probably the most important vegetables in this section, for they are most often eaten raw. It is usually recommended that raw vegetable salads be eaten frequently to provide vitamin C, because if vegetables are cooked too much, too slowly, with soda, or in a large quantity of water, or are kept hot in dishes for a long time before being served, most of the vitamin C will be destroyed, and sometimes it is difficult to avoid some of these practices.

However, salads of the type frequently served in New Zealand restaurants—one or two lettuce leaves and a slice of tomato—or salads which consist mainly of chopped lettuce with a sprinkling of egg, tomato, or other vegetable on top, cannot be relied on to make good any deficiency in vitamin C, for lettuce is not a very good source of this vitamin. For example, 3oz. of lettuce—a very generous serving—provides only about a third as much vitamin C as a similar quantity of cabbage or silver beet cooked quickly in a minimum of water. Celery and cucumber are even poorer sources of vitamin C, but other salad vegetables, especially tomatoes and cress, contain important amounts of vitamins C and A. Some of these vegetables, especially parsley, chives, and mint, can be used only in small amounts because they are strongly flavoured, so that, though they do not detract from the nutritive value of the salad, they do not greatly improve it.

Cabbage salads, or salads in which tree tomatoes, tomatoes, and cress, for example, are not used merely for flavouring but are important ingredients, have a higher nutritive value and provide between a third and two-thirds of the daily requirement of vitamin C. Cooked vegetables such as peas, carrots, and potatoes, while contributing to the general nutritional value of the salad, are also unreliable sources of vitamin C, much of it often being lost while the vegetable is kept after being cooked.

Therefore, salads, if they are served with the intention that they should be the main source of vitamin C in the menu for the day, should contain plenty of some of the good sources of this vitamin—that is, they should either be cabbage salads or contain generous amounts of tomatoes, tree tomatoes, or other vitamin-rich fruit, or watercress. Other salad vegetables make a useful contribution to the daily needs of vitamins and minerals, but they are not as valuable nutritionally as is often supposed.

Roots, Tubers, and Pumpkins

Many of these vegetables have a higher energy value than green vegetables, but usually they contain less vitamin C and vitamin A. Kumaras, yams, potatoes, and parsnips contain the most starch and therefore have the highest energy value—about a third that of bread. Some of the others, especially white turnips and swedes, have no higher energy value than green vegetables. Those with the highest energy value are fair sources of vitamin B_1, 5oz. of potatoes—a generous serving—containing at least a tenth of the daily requirement. They are all fair sources of vitamin C, particularly swedes, and yellow vegetables, kumaras, pumpkins, and especially carrots are good sources of vitamin A.

In addition, root vegetables, unlike green vegetables, retain some vitamin C even after long periods of storage; freshly-dug potatoes provide half of the daily vitamin C requirement per serving, and after 6 months' storage provide at least a tenth of the requirement. Consequently, as they also are fair sources of other vitamins, energy, and iron, they are of relatively-high nutritive value and should not be omitted from the menu even by overweight people, for there are many less nutritious foods with a higher energy value which could with benefit be excluded instead.

Other Vegetables

Marrows, sweet corn, chokos, egg fruit, and mushrooms have less food value and especially less vitamins C and A than other vegetables, though when cooked and eaten with butter, as they often are, their vitamin A and energy value are increased considerably.

Fruit

The nutritional value of fruit depends largely on its vitamin C or ascorbic acid content, for, excluding vegetables, they are the only foods which contain more than negligible amounts of this essential vitamin. Apart from their energy value, which, though not high, is generally greater than that of vegetables (bananas, grapes, figs, and black currants all have an energy value similar to or greater than that of potatoes), they are usually poorer sources of other nutrients, so their nutritional value may be estimated mostly in terms of their vitamin C content.

Fruits which contain much vitamin C, such as black currants, rose-hip syrup, citrus fruits, other berry fruits, passion fruit, tomatoes, tree tomatoes, pineapples, persimmons, gooseberries, Chinese gooseberries, rock melons, and Sturmer apples are the most nutritious. Other apples, quinces, apricots, nectarines, peaches, bananas, and rhubarb contain moderate amounts of vitamin C (an average apple or banana provides about a sixth of the daily requirement) and, like other fruits, add relatively-small amounts of other minerals and vitamins to the total daily consumption.

Most of the other fruits which are poor sources of vitamin C, including grapes, figs, loquats, pears, plums, and cherries, are also popular and even have a reputation for being nutritious, but as 4oz. of any contain a fifteenth or less of the daily vitamin C requirement, and as their content of other nutrients is uniformly low, they must take their place with chocolates, jellies, and other foods as very pleasant desserts without which the menu may be less interesting but which are not necessarily included in the healthful diet.

Tinned Fruits and Vegetables

There are still some people who are prejudiced against the use of tinned fruits and vegetables, though the quality of the food used for preserving, as well as the standards of hygiene and treatment, have improved so much that the nutritive value of tinned vegetables is equal to and sometimes greater than that of home-cooked vegetables, especially if the latter have been picked and stored for some time before use. Consequently, they can be substituted for home-cooked vegetables whenever necessary with complete confidence, though naturally the vitamin C content is somewhat less than that of the raw vegetable. Tinned fruits also retain their vitamin C well.

Home-bottled vegetables, because they have to be cooked for long periods to ensure that they will keep, are not reliable sources of vitamin C.

Dried Vegetables

Beans, peas, and lentils are the principal dried vegetables in use, for, though methods of drying and storing other vegetables have improved greatly in recent years, the fresh ones are still infinitely to be preferred, particularly in New Zealand, where some fresh vegetables are available throughout the year.

Dried peas and beans, haricot beans, or split peas all have a fairly-high nutritive value. Vitamin C is destroyed and they contain negligible amounts of vitamin A, but they are good sources of vitamins of the B group and iron and fair sources of protein and energy.

Value of Balanced Diet

This article and the previous one have been concerned with the nutritive value of the majority of the foods which are necessary for the healthful, well-balanced diet. Their great variation in nutritive value may seem surprising at first and may even cause wonder that malnutrition does not occur more frequently. Fortunately, the average diet consists of a reasonably well-balanced mixture of these foods, so that nutrients lacking in one are provided in abundance by another. In addition, the body has a very good ability to store most nutrients, so that a surplus of, say, vitamin A obtained one day when the menu includes liver for breakfast, carrots for dinner, and a green salad for lunch or tea will be utilised a week later when cauliflower and potatoes are served with the meat for dinner and when, apart from milk and butter, other good sources of vitamin A are not included in the menu.

As long as food fads and preferences are not allowed to play too important a part in the composition of the diet, which should consist predominantly of foods from each of the four main groups—whole cereals; milk, dairy products, and meat; vegetables and fruits; and fats—malnutrition is unlikely to occur.

THE DEVELOPMENT OF SPEECH

SPEECH is the use of words as the symbols of thought. It is the supreme human trait—that which distinguishes man from the rest of the animal species. It is the product of the entire body functioning simultaneously and harmoniously, and its foundations are laid in early infancy. To parents wishing the best for their children it is impossible to overstress the importance of those statements. This article, the fourth of a series by Dorothy Johnson, Rural Sociologist, Department of Agriculture, Christchurch, on child care and development, outlines the development of normal speech in a child and points out some of the pitfalls.

CRYING is the baby's first language and it expresses his physical and emotional needs. It is literally a call for help and marks his utter dependence on other people. It tells of pain and discomfort, hunger and anger, fear and anxiety. Sudden changes, strangeness, solitude, and fatigue also make him cry. The specific cause can usually be detected by the type of cry. Crying needs sympathetic interpretation and is generally justified; the wisdom of letting a baby "cry it out" is very doubtful.

Other kinds of language develop as social experiences multiply in the baby's life. His smiles and his laughter emerge from social situations and mark the first experiences of pleasure, as his cry expresses vividly his forlorn and desperate demand for aid. He learns by listening, and at first responds by action. His posture and expressions convey his reaction to what he hears so graphically that speech sometimes seems unnecessary. In fact, parents and families are tempted to interpret these actions so accurately in the first few years that they are in danger of delaying markedly his acquisition of speech.

Efficiency and Moderation

Such delay can also be the unfortunate result of too great efficiency on the part of those who look after babies and small children. Whether they are nurses or mothers, most very efficient people have built up fairly-complicated patterns of work habits as housewives of a high, even meticulous, standard. The care of children is fitted into that pattern. The child's schedule of feeding, bathing, toilet, and sleep is competently cared for, but they do not dally much in sweet verbal commentaries with their charges. Such children are not likely to be fluent speakers until they do have conversations and other social experiences.

This is not to suggest that general efficiency has no place in the bringing up of children; very decidedly it has. But, if there is any special note running through these articles, it is perhaps that efficiency needs to be used in assessing values, in this case the planning of routines which cope with the necessary work in order to give more time to be spent living with the children, especially in the early years.

It is perhaps unnecessary to say that a valuable keynote to all work with children is moderation. As the proverb has it: "Moderation is the silken string running through the pearl chain of all virtues." A phrase used in these articles to denote the aim of child guidance was the production of a balanced or well-poised personality. Either of those adjectives denotes the holding in position of opposing characteristics or forces. Moderation lies in keeping the balance between the "too much" and the "too little" in everything.

The First Sounds

While a baby at first responds by action to the social advances of other people, he also practises making sounds. From birth he has been training his organs of speech, the muscles and nerves of his lips, tongue, throat, and vocal chords. They are the ones he uses 6 times a day at his meals, in sucking, swallowing, and chewing. He does not limit his exercises to those periods. He practises when he wakes in the morning—but not for too long, as the suggestion of food becomes overstrong and he changes to crying. He practises again after meals before sleep overtakes him. Usually he has a delighted audience in his family, unless the desire takes him too early in the morning.

Before he is 2 months old, throaty sounds emerge from these exercises. He repeats them many times, savouring every one. It is real, sensuous enjoyment to the baby. By 4 months he is talking to himself, cooing and babbling. He uses vowel sounds first and later joins on the consonants formed by the closed lips and the palate, for example, M, D, and W. He is then able to astound his gratified parents by seemingly calling them by their parental titles—"Ma—ma," "Da—da." When he says "wa—wa" he may even be presented with a drink of water.

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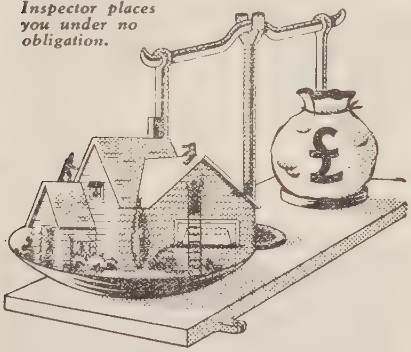

No. 1 PLAN. Boracure "Guaranteed Service" Quotation. Complete Boracure service to all accessible parts of property. A year after initial treatment, another inspection is given and any further necessary treatment undertaken. Two years later the process is repeated, and repeated again in another two years, or at other suitable intervals. Cost is worked out on basis of property area. Two thirds of this contract price is paid on completion of first treatment. Property owner withholds remaining third and pays this balance in three instalments when stipulated inspections and treatments are given.

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Should the illusion be shattered? At that stage what he says cannot be purposive. He can only imitate the sounds he has already made in his babbling play, but perhaps the sounds "Mama" and "Dada" become impressed on his mind by the delighted reception accorded them. He sees there is value in the sounds he makes. People bring things. As soon as he makes sounds like words and his family begin praising and encouraging him, he will try to imitate himself and become proud of his ability. Such encouragement is a great help in teaching him to speak. By the time he a year old he can say one or two words. Probably he can understand many words before he can say any of them.

From Jargon to Speech

In his second year he talks jargon before he can name things properly and express what he wants. He will name a picture and will repeat things said to him. Exclamations and names of objects are learnt first, but he soon follows them with phrases and simple sentences. From then on his vocabulary will grow almost daily, most of it being learnt through imitation.

The faculty of coherent speech in complete sentences of 5 or 6 words should be fully developed in the 4-year-old, and if the child does not attain this standard, obviously he needs some special help. Teachers agree that by the age of 5 years the speech of most New Zealand children of average intelligence can be followed readily—that is, the child's conversation is understood with no great difficulty by adults outside his family circle. Not all his speech sounds are or should be correct at this stage. Children vary greatly in the age at which they reach different stages in their development.

By the time the child is 7 years old he may be familiar with almost 3000 words, but the number of words a child can use varies with his intelligence; in fact, the development of speech is one of the methods experts use for measuring intelligence. However, the standard of speech and understanding achieved depends greatly on the extent to which parents work, live, play, and talk with their children.

Early Influences

There are some very important points here for parents. One is the realisation of how far back go the influences that make for the good speech which is intimately connected with personality development. Research work by Dr. H. B. Ross, of Michigan University, shows that swallowing, sucking, and chewing are the basis of speech movements. At the speech clinic in that university it was found that the majority of the 64 children classed as stutterers had had insufficient training in chewing, sucking, and swallowing to make possible the attainment of accuracy in the highly-specific activities of speech. Bottle feeding, delayed solid feeding (especially chewing), and late weaning were found in these cases singly and together. They are not the only disturbances in the right development of speech, but they are listed first and rightly so, as they are preventable. Modern baby schedules provide for and urge the inclusion of these activities, which help to develop the finely-co-ordinated and complex movements used in speech. While speech is impossible or imperfect without them, so is the development of a confident and balanced personality impossible without the power of fluent speech.

Another point of significance is that social play experiences are the needed background to the development of language. In an article on "Play Ways in Speech Development" Miss M. E. Saunders, formerly chief therapist of the Speech Clinic, Christchurch, states: "Play is so important because it implies freedom from fears and anxieties and freedom for practice and experiment. It provides the opportunities to express wishes and feelings as well as the opportunity to talk. The period which is devoted to play between mother and child is one of the most precious in the child's day. It is one of the most pleasurable and satisfying times in his experience. He feels thoroughly secure and happy in being loved. He is free to unfold his natural capacities. He is ready to respond. A game should be made of learning and should be played with him. Let it be 'the two of us together will do this' or 'we two can do wonders.' To young mothers a word of caution must be given: Care must be taken not to over-excite a young child."

If the child is slow in speech, he should be given the confidence that it will be overcome; no defect should be admitted in talking to other people. The model should be the clever mother who cheered and reassured her child exposed to a visitor's injudicious question "He's awfully slow in talking, isn't he?" by saying "Oh, he'll probably surprise us all with his talking one day."

"Much can be done to ensure good natural speech development. It should be borne in mind that speech is part of the whole person. Think of your speech on the day when you are feeling relaxed and at peace with the world and compare it with the thin, querulous tones and rapid utterance of the days when you are feeling unwell or are anxious. Anything that helps the child as a whole will help his speech. A good daily routine with well-balanced meals, adequate rest, judicious easing of the trials and strains of childhood, the security that comes from a knowledge of his parents' love and assistance—all these things help toward good speech development." (Miss M. Gane, editor of the "Speech Therapists' Journal.")

Factors in Good Speech Development

1. The child learns most of his speech through imitation, so do not imitate the child's baby talk. Saying "dravy" for "gravy" and "wed" for "red" because the baby talks that way confirms him in his difficulty. But do not correct him. If the parents keep on talking English, he will, too, as soon as he can. Never talk down to babies and little children.

2. Do not correct the child's pronunciation or enunciation. Applaud that which is right, but do not stress that which is wrong at any time; just ignore failures.

3. Never condemn or ridicule the child's efforts, or compare him with another child to his disadvantage.

4. Do not nag or coax or raise the voice in an effort to get the baby to talk. Let speech come when he is ready.

5. Give the child a chance to talk, and listen to him when he talks. That will encourage him a lot.

6. Always be sure the child listens to what is said to him. Say what is meant clearly, and try to say it once only. Many people maintain that a radio set which plays all day by its familiarity leads children into the habit of not listening. Include the child in family conversation whenever possible.

7. Encourage a child to ask for what he wants. That is especially important where there are many elders. Even if his speech is not good, it is wise to expect him to make the effort. Do not allow the child to have things for which he merely makes signs.

8. Guard the tone of the parents' voices. Let their speech be of a slow, careful pattern. Be cheerful, reassuring, and careful not to show any anxiety about a child's speech. Even a child with a speech difficulty should not be allowed to become speech-conscious.

THE DEVELOPMENT OF CHILDREN'S SPEECH . . .

9. At all ages be sure the child has play-fellows of his own age and opportunity for free play with no adults present.

10. Provide well-illustrated, attractive books appropriate to his age.

11. Remember the play-hour, for co-operation and companionship lead to skill, co-ordination, and success. Speech should always be good fun. In the pre-school period some of the most useful play activities are:—

The traditional finger and toe plays —for example, "knock knock at the door," "this little pig went to market," and "pat-a-cake, pat-a-cake."

Games involving the imitation of engines, motor- cycles, aeroplanes, bees, birds, animals, the wind, and the sea.

Plenty of singing and talking games. When out for a walk play the game "I see something red. Is it a bus? Is it a gate? etc."

Nursery rhymes recited and sung together. These are for the enjoyment of the fun and the speech and the rhythm. They must not be spoilt by making them speech-correction exercises. The child who has plenty of pleasant speech in this way will develop a good speech naturally and unconsciously. That is the ideal.

Plenty of bed-time stories. Include some with a chorus or a recurring phrase in which the child can join—for example, "The Gingerbread Boy" and "The Pig who wouldn't Jump over the Stile."

As well as providing speech practice, the suggestions listed provide good ear-training exercises.

Speech Disabilities

If the faculty of coherent speech in complete sentences of 5 or 6 words is not fully developed in a 4-year-old, the child needs some special help. Unfortunately speech disabilities do exist. Research work in New Zealand as yet is insufficient for the incidence of these speech defects to be known, but one investigation suggests that only 20 per cent. of the new entrants to school in a New Zealand city have complete mastery over the mechanics of speech. In America it has been found that 10 per cent. of the population have speech difficulties, including stuttering and stammering.

Any disorder of speech is so significant in the future life of the child that parents will do well to seek competent advice at the earliest possible moment.

In speech, as in many other areas of knowledge, much has been learnt by and through attempts to help children who for a variety of reasons are handicapped by a disability. It has already been shown that some of these difficulties can be prevented. Some cannot, but all need treatment. Incoherent speech is a great handicap in a child's development, especially when he reaches school age. Sometimes recovery is made without outside help, but should the child be subjected to the waste of energy and strain involved in such an unaided return to normal? That is the question asked by speech-therapy specialists who have co-operated in supplying the material in this article.

New Zealand parents are fortunate in that remedial work in this country is part of the system of education. The establishment of a training centre for speech-therapy specialists in Christchurch has made possible speech clinics in all the main centres and many of the smaller ones. The specialists in charge consider that an enormous saving of trouble and distress for the child could be effected if it were recognised that treatment should begin at 4 years of age and earlier for cleft-palate cases, which means that it should begin at home in the pre-school years. Parents can help their children and can receive help themselves. Those in the country can obtain advice from the clinic in their nearest centre.

Early Years are Vital

The first 4 or 5 years are vital ones for the child, as in them he perfects his techniques in the art of speech. There is no place like his home for the child to find the natural stimulus to speech. By his mastery of words he acquires the important skill of communication with his fellows, which in turn produces confidence in going forward to make relationships with other people.

It is worth while taking time to understand though not to interfere in a baby's growing. In speech or in any other of its aspects he must do his own growing. For parents the aim is appreciation of what he is accomplishing, of its significance in his total development, and of the privilege of being there to guide him through understanding when stumbling blocks appear.

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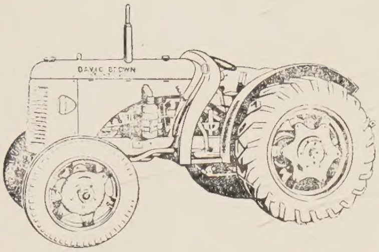

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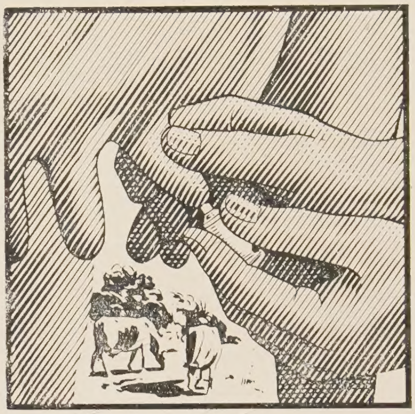

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